

**Interlaboratory Study 99-2  
Polychlorinated Dibenzo-P-Dioxins,  
Polychlorinated Dibenzofurans and  
Dioxin-like Polychlorinated  
Biphenyls in Solid Matrices**

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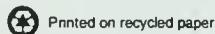
# Interlaboratory Study 99-2

## Polychlorinated Dibenzo-P-Dioxins, Polychlorinated Dibenzofurans and Dioxin-like Polychlorinated Biphenyls in Solid Matrices

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## 1 EXECUTIVE SUMMARY

Certified reference materials (CRMs) are an important analytical tool to validate methodology, assess within-laboratory performance and verify between-laboratory performance. There is an international demand for matrix-matched CRMs for a broad range of environmental programs.

Laboratory Services Branch (LSB) of the Ontario Ministry of the Environment (MOE) identified a sediment from Lake Ontario as a potential CRM, when repeat analysis demonstrated excellent reproducibility for Polychlorinated Dibenzo-p-dioxins (PCDDs), Polychlorinated Dibenzofurans (PCDFs), and Dioxin-like Polychlorinated Biphenyls (DLPCB) congeners, as well as various other analytes of environmental interest. A large amount of the sediment was collected in 1998, homogenized, bottled, and identified as LSBRM9801.

Interlaboratory study 99-2 was initiated to validate LSBRM9801 for PCDDs, PCDFs, and DLPCBs. Participants received two samples of LSBRM9801, but they were not identified as duplicates. Three other sediments were provided from the National Water Research Institute (NWRI) and the National Institute of Standards and Technology (NIST) to be part of this study. Also included were injection-ready solutions of PCDDs/PCDFs and the DLPCBs provided by Wellington Laboratories, Ltd.

Thirty-six laboratories from around the world agreed to participate and data was received from thirty-four of the participants. A preliminary table of results was provided to the participants and some corrections were provided to the data. Evaluation of the sediments provided by NWRI and NIST are being done by the respective agencies.

The duplicate results from LSBRM9801 were pooled and outliers removed. A reference value was assigned for 35 parameters and provisional values assigned to 2 parameters. Details of this procedure are published elsewhere<sup>[4]</sup>.

An assessment of laboratory performance of the injection-ready solutions was done against the target values provided by Wellington Laboratories. Participants that were biased high or low are identified (by laboratory ID code).

An assessment of laboratory performance against the assigned reference values of LSBRM9801 was done, using a modification of the K-S Procedure<sup>[5,6]</sup>. Participants whose results were outside the range of acceptable performance were assessed as being biased high, biased low, or erratic.

## 2 INTRODUCTION

Matrix-matched environmental certified reference materials (CRMs) are one of the most valuable tools used to validate analytical methods, assess analytical laboratory performance and to assist in the resolution of data conflicts between laboratories. The role of CRMs in ensuring the accuracy of the analytical data produced by environmental laboratories is well known. As the demand for more analytical data has increased, to support various environmental initiatives, such as site decommissioning guidelines, remedial action and sediment studies for bio-accumulation in benthic organisms, an increasing number of laboratories are now providing analytical services. The availability of suitable CRMs that contain a wide range of analytes, particularly at concentrations levels close to 'maximum allowable levels' stipulated in various guidelines / regulations, becomes very important to ensure that the best quality data is produced in support of health guidelines and regulatory enforcement.

A recent survey of available CRMs<sup>[1]</sup>, indicated that while there are a limited number of sediment reference materials for Polychlorinated Dibenzo-p-dioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs), there is none for the complete set of twelve Dioxin-like Polychlorinated Biphenyls (DLPCB) congeners for which Toxic Equivalence Factors (TEF) have been designated by the World Health Organization (WHO)<sup>[2]</sup>.

A Lake Ontario sediment was identified as a potential reference material when repeat analysis of PCDDs and PCDFs in this sample in 1994 showed extraordinary reproducibility of results. This sediment has excellent homogeneity and contains a very complex mixture of analytes at low (many at 5 to 25 x Method Detection Limits, MDL) levels. Analyte groups identified along with PCDDs and PCDFs include: DLPCBs, polynuclear aromatic hydrocarbons (PAHs), brominated diphenylethers, PCBs, trace metals, and a few organochlorine pesticide compounds. Because of these rare properties, this sediment was considered as the first Laboratory Services Branch (LSB) Candidate Certified Reference Material and assigned the identifier LSBRM9801.

In 1998, LSBRM9801 was used as a Performance Evaluation material as part of a workshop for the analysis of PAHs in sediments. The agreement in results from the small number of participating laboratories (11) confirmed its usefulness as a reference material<sup>[3]</sup>.

Interlaboratory Study 99-2 was initiated in the fall of 1999 to provide data to validate LSBRM9801 as a CRM.

## 3 STUDY DESIGN

### 3.1 SAMPLE PREPARATION - LSBRM9801

The Canadian Centre for Mineral and Energy Technology (CANMET), certified to ISO 9002 standards, was contracted to perform the physical processing of sediment collected. This included the following steps: a) air drying at room temperature; b) crushing to break the agglomerates; c) further air drying at room temperature; d) initial sieving through a 1.40 mm (14 mesh) screen; e) sieving the -1.40 mm fraction through a 75 µm (200 mesh) screen; f) grinding of all +1.40 mm and +75 µm fractions; g) resieving the ground material through the 75 µm screen; h) regrinding the +75 µm fraction; i) sieving the re-ground material through the 75 µm screen; j) blending the three fractions of -75 µm mesh material; k) bottling the material in 25 g aliquots; and l) labeling. A total of 1200\*25g bottles were produced.

Homogeneity testing was performed by CANMET using trace metal analysis by Neutron Activation Analysis (NAA) and by LSB using Total Organic Carbon analysis. Using

ANOVA, the ratio of between-bottle to within-bottle mean squares (*F calculated*) was compared to the *F Statistic* at the 95% Confidence Level. For all the tests reported, the *F calculated* was less than the *F Table* values, so there was no evidence of inhomogeneity.

For this study, two bottles of this material were submitted to each participating laboratory. They were designated Sample 4 and Sample 6, but were not identified as duplicate samples.

### 3.2 SAMPLE PREPARATION - STANDARDS AND ADDITIONAL SOLID MATERIALS

Wellington Laboratories Inc. prepared and validated the injection-ready solutions used in this study. Target values were provided to the study coordinators and are listed in Tables 1 and 2 of Appendix 1. Sample 1 consisted of PCDDs and PCDFs in nonane. Sample 2 consisted of DLPCBs in nonane.

An additional solution was prepared by Wellington Laboratories containing  $^{13}\text{C}_{12}$ -labeled DLPCBs. This material, named Sample 3, was provided to the participants to use as a surrogate spiking solution. Its use was optional and an information sheet (see Appendix 7) was provided to the participants.

The National Water Research Institute (NWRI) of Environment Canada provided 50 containers of their CRM DX-3. It had been previously certified for PCDDs and PCDFs, but not for DLPCBs. It was labeled Sample 5.

The National Institute of Standards and Technology (NIST) provided 50 containers each of SRM 1939 and 1941a. Each has previously been certified for various analytes. SRM 1939 was labeled Sample 7 and SRM 1941a was labeled Sample 8.

### 3.3 SAMPLE DISTRIBUTION

Notification of this interlaboratory study was by direct mailing to laboratories known to analyze for PCDDs/PCDFs and via a notice at Dioxin'99 in Venice, Italy. Thirty-six laboratories agreed to participate. All participants were assigned a unique, confidential identification (ID) code.

Samples sets consisting of three ampouled solutions and five solid samples were shipped via courier to the participants on November 2, 1999. Included were an instruction sheet, an information sheet for Sample 3, report forms, a methodology questionnaire, and a diskette in a mailer containing electronic versions of the report form and questionnaire. All laboratories were asked to use their routine methods for the analysis of these samples. A copy of all correspondences is provided in Appendix 7.

Participants were asked to report their results, preferably electronically, by January 31, 2000. Results were accepted up to the middle of March 2000.

### 3.4 DATA EVALUATION TECHNIQUES

All the participants who reported values, submitted their results electronically. Some of the laboratories provided hard copies of their results as a back-up.

The results from the participants were entered into separate tables for each sample (Samples 1, 2, 4 - 8). An electronic preliminary table of results was sent to 31 laboratories

who had provided data, on March 21, 2000. Laboratories were asked to respond with any transcription errors by March 31, 2000.

Corrections to the initial data were provided by several laboratories. As well, two more participants provided data sets.

The final data sets are presented in Appendix 1. For each parameter in each sample, the study mean, standard deviation, and coefficient of variation has been calculated. Results that were reported as “<” or ND were excluded from the calculations. No calculations to determine outliers have been done in these tables, with the exception of two results for PCB169, which differed from the other participants by two orders of magnitude. See notes in Tables 6 and 7 of Appendix 1 for identification of these two values.

A summary of the methodology questionnaire has been provided in Appendix 5.

Further evaluation of the results for Sample 5 (NWRI DX-3), and Samples 7 (NIST SRM 1939) and 8 (NIST SRM 1941a) will be done by the respective agencies providing the samples.

### 3.5 EVALUATION OF INJECTION STANDARDS (SAMPLES 1 AND 2)

To provide a rapid evaluation of the between laboratory results for the injection standards, the results have been presented in a graphical format in Appendix 2. For each parameter, a bar graph was plotted of the results from the participants, with the target value provided by Wellington Laboratories drawn as a horizontal line.

### 3.6 EVALUATION OF LSBRM9801 (SAMPLES 4 AND 6)

For the purposes of establishing reference values for LSBRM9801, the results from Samples 4 and 6 were pooled into one data set. After removing the “<” and ND results, further assessment was done to identify outliers. Certified values were assigned for all, but 2 parameters, for which provisional values were assigned. This evaluation was presented at the Biological and Environmental Reference Material (BERM) 8 conference in Bethesda, Maryland, (September, 2000) and is published elsewhere<sup>[4]</sup>. The table of assigned reference values has been included in Appendix 3.

To provide an assessment of interlaboratory performance on LSBRM9801, a modification of the Youden<sup>[5,6]</sup> technique was applied to the complete set of results from Samples 4 and 6. For each parameter, each participant’s results have been plotted on an X-Y plot. A vertical and horizontal line at the assigned reference value has been drawn for each axis to divide the graph into four quadrants. As well, a 45° line has also been drawn between the origin and through the intersection of the reference values. Laboratories whose results fall on the 45° line demonstrate good within-laboratory precision. The spread of results along this line in the upper right and lower left quadrants indicates the between-laboratory bias (high or low). Results in the upper left and lower right quadrants are considered erratic.

A circle, centered on the intersection of the reference values and with a radius of the reference uncertainty value (Appendix 3), has also been included in each graph. Participants whose results are inside the circle, have demonstrated satisfactory performance and their data points have not been individually identified, primarily due to overcrowding. Participants whose results are outside the circle, are recommended to investigate the possible source(s) of variability in their methodology, sample handling, data handling, etc. These results have been individually identified and are summarized in Table 9 (Appendix 4). All graphs (Figures 30 to 57) are provided in Appendix 4.

#### 4 DISCUSSION

The interlaboratory means for PCDDs and PCDFs in Sample 1 (Table 1, Appendix 1) demonstrate good agreement with the design values. All means were within 5% of the design values. The between-laboratory variability was consistent, with the coefficient of variation (CV) ranging from 20 to 28%. Laboratories 99203 and 99230 consistently demonstrated a high bias, as seen in Figures 1 to 17, Appendix 2. Laboratories 99205, 99207, 99209a, and 99218 demonstrated a low bias. Laboratory 99219 was biased low for the PCDDs (Figures 1 to 7), but was biased high for the PCDFs (Figures 8 to 15). Laboratory 99206 was biased high for the PCDFs (Figures 8 to 17). Laboratory 99236 was biased low for many of the PCDFs (Figures 12 to 15, 17). A result was considered biased if it differed from the design value by more than 25%.

The interlaboratory mean for PCB81 in Sample 2 (Table 2, Appendix 1) differed from the design by almost 50%. It was strongly influenced by 3 high values, as is reflected in the high CV (143.5%). The interlaboratory mean for all of the other DLPCBs in Sample 2 were within 10% of the design value, and the CVs ranged from 23 to 36%. Using the same criteria ( $\pm 25\%$  difference from the design value) as for the PCDDs and PCDFs, Laboratories 99204, 99209b and 99230 demonstrated a high bias (Figures 18 to 29, Appendix 2). Laboratories 99201 and 99226 were biased high for several of the higher chlorinated DLPCBs (Figures 26 to 29). While none of the other laboratories were consistently low for all of the DLPCBs, Laboratories 99224 and 99232 were biased low for several DLPCBs.

The interlaboratory mean for Sample 4 (Table 3, Appendix 1) and Sample 6 (Table 5, Appendix 1) showed good agreement for most parameters. The means differed by less than 10%, except for 1,2,3,4,7,8-HxCDD, 1,2,3,7,8,9-HxCDF, PCB126, PCB169 and PCB 189. Only for PCB169 did the means differ by over 40%. Interlaboratory performance was very variable for 1,2,3,7,8,9-HxCDF, resulting in only a provisional reference value being assigned to this parameter<sup>[4]</sup>. These results confirm the homogeneity of LSBRM9801, as the two samples were not identified as duplicates to the study participants.

Table 9 in Appendix 4 summarizes individual laboratory performance for the analysis of LSBRM9801. Laboratories 99206, 99224a, 99229, and 99239 were biased low for many of the PCDDs. Laboratories 99212, 99216, and 99219 tended to be biased high for the PCDDs. Laboratory 99208 was biased high for many of the PCDFs, while Laboratory 99229 was biased low for many of the PCDFs. Laboratory 99206 had problems with the PCDF analysis, as they demonstrated erratic performance for most of these analytes.

Laboratories 99203, 99203, and 99218 were biased high for many of the DLPCBs. Laboratories 99223 and 99228 were biased low for many of the DLPCBs. Laboratory 99209b had problems with the DLPCB analysis, as they demonstrated erratic performance for most of these analytes.

The methodology between the laboratories varied considerably for sample preparation and clean-up. The amount of sample initially used for analysis ranged from 1 to 20 grams. Most participants used Soxhlet extraction with toluene as the extraction solvent (Appendix 5). Most participants used Silica and ALOX columns as part of the clean-up process, but there was a broad range of final solvents used for the sample (Appendix 5).

All but two of the laboratories used Gas Chromatography/High-Resolution Mass Spectrometry (GC/HRMS), with Helium as the carrier gas for PCDD and PCDF analysis. However, there was a very broad range of GC columns used. Approximately half of the participants used a single column and half used dual column analysis for the PCDDs and PCDFs. The majority of participants corrected for surrogate recovery.

Sample preparation for the DLPCBs was similar to PCDD and PCDF analysis, though some participants used additional columns in the clean-up process. Two laboratories had two fractions in different solvents for the DLPCBs (Appendix 5).

Only 3 participants used dual column analysis for the DLPCBs. The majority used GC/HRMS and Helium as the carrier gas. Almost every laboratory used a different combination of labeled standards. This may be one of the most significant sources of between-laboratory variability for DLPCB analysis, as the majority of participants corrected for surrogate recovery, but were correcting to a different reference point.

## 5 REFERENCES

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## 7. APPENDIX 1: ANALYTICAL DATA

### LEGEND FOR DATA TABLES

2,3,7,8-TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin
1,2,3,7,8-PeCDD	1,2,3,7,8-Pentachlorodibenzo-p-dioxin
1,2,3,4,7,8-HxCDD	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin
1,2,3,6,7,8-HxCDD	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin
1,2,3,7,8,9-HxCDD	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin
1,2,3,4,6,7,8-HpCDD	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
1,2,3,4,5,6,7,8-OCDD	1,2,3,4,5,6,7,8-Octachlorodibenzo-p-dioxin
2,3,7,8-TCDF	2,3,7,8-Tetrachlorodibenzofuran
1,2,3,7,8-PeCDF	1,2,3,7,8-Pentachlorodibenzofuran
2,3,4,7,8-PeCDF	2,3,4,7,8-Pentachlorodibenzofuran
1,2,3,4,7,8-HxCDF	1,2,3,4,7,8-Hexachlorodibenzofuran
1,2,3,6,7,8-HxCDF	1,2,3,6,7,8-Hexachlorodibenzofuran
1,2,3,7,8,9-HxCDF	1,2,3,7,8,9-Hexachlorodibenzofuran
2,3,4,6,7,8-HxCDF	2,3,4,6,7,8-Hexachlorodibenzofuran
1,2,3,4,6,7,8-HpCDF	1,2,3,4,6,7,8-Heptachlorodibenzofuran
1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8,9-Heptachlorodibenzofuran
1,2,3,4,5,6,7,8-OCDF	1,2,3,4,5,6,7,8-Octachlorodibenzofuran
Total TCDD	Total Tetrachlorodibenzo-p-dioxins
Total PeCDD	Total Pentachlorodibenzo-p-dioxins
Total HxCDD	Total Hexachlorodibenzo-p-dioxins
Total HpCDD	Total Heptachlorodibenzo-p-dioxins
Total TCDF	Total Tetrachlorodibenzofurans
Total PeCDF	Total Pentachlorodibenzofurans
Total HxCDF	Total Hexachlorodibenzofurans
Total HpCDF	Total Heptachlorodibenzofurans

TABLE I - SAMPLE I (INJECTION STANDARD) in ng/mL

PARAMETER	CAS NO.	DESIGN	99201	99203	99204	99205	99206	99207	99208	99209a	99209b	99211	99212	99213	MEAN	SD	CV	n
2,3,7,8-TcDD	1746-01-6	25.0	23	30.1	24.2	19.7	19.8	19.4	26	19.3	27	21.77	24.4	19.52	24.07	4.75	19.8%	34
1,2,3,7,8-PeCDD	40321-76-4	62.5	58	69.8	75.9	48.0	51.0	44.9	65.2	45.9	56	50.97	64.9	47.73	61.31	12.00	19.6%	34
1,2,3,4,7,8-HxCDD	39227-28-6	62.5	77	106.1	60.7	18.8	51.2	42.7	68	50.0	65	53.64	61.3	47.15	61.07	16.13	26.4%	34
1,2,3,6,7,8-HxCDD	57653-85-7	62.5	71	86.9	58.3	19.3	58.7	41.8	76.6	46.8	50	59.26	60.0	55.81	62.32	14.85	23.8%	34
1,2,3,7,8,9-HxCDD	19408-74-3	62.5	62	81.2	59.3	21.1	54.8	51.8	69.4	50.5	53	57.63	62.6	45.86	59.90	13.69	22.9%	34
1,2,3,4,6,7,8-HpCDD	35822-46-9	62.5	67	84.6	71.2	26.2	71.3	40.5	71	45.2	62	62.21	70.6	56.62	63.66	12.81	20.1%	34
1,2,3,4,5,6,7,8-OCDD	3268-87-9	125.0	130	161.2	97.2	49.0	136.3	78.3	124.8	98.5	104	111.62	150	137.23	124.29	29.77	24.0%	34
2,3,7,8-TcDF	51207-31-9	25.0	26	35.2	27.3	19.5	35.2	17.1	33.4	18.3	24	23.63	23.5	21.49	26.65	6.11	22.9%	34
1,2,3,7,8-PeCDF	57117-41-6	62.5	68	83.6	70.3	51.0	102.3	42.9	71	35.7	39	53.15	64.9	55.15	64.00	14.89	23.3%	34
2,3,4,7,8-PeCDF	57117-31-4	62.5	61	80.8	67.7	53.0	87.9	35.1	76	38.4	41	50.68	63.7	51.7	63.67	14.71	23.1%	34
1,2,3,4,7,8-HxCDF	70648-26-9	62.5	55	75.7	63.6	19.7	93.8	40.4	71.6	40.8	53	57.60	56.2	53.17	62.16	14.89	24.0%	34
1,2,3,6,7,8-HxCDF	57117-44-9	62.5	42	77.3	60.8	20.3	99.8	38.4	70.2	40.3	65	56.52	62.5	57.89	63.15	16.77	26.6%	34
1,2,3,7,8,9-HxCDF	72918-21-9	62.5	45	74.8	56.5	25.0	82.2	37.4	69.8	38.1	59	57.46	52.6	44.86	61.15	16.48	26.9%	34
1,2,3,4,6,7,8-HxCDF	60851-34-5	62.5	44	71.3	64.2	21.9	58.8	36.5	72.4	38.9	58	58.18	52.8	53.37	61.53	17.51	28.5%	34
1,2,3,4,6,7,8-HpCDF	67562-39-4	62.5	62	79.8	62.4	22.1	105.7	39.2	79.8	42.4	42	55.07	63.5	55.13	63.40	16.94	26.7%	34
1,2,3,4,7,8,9-HpCDF	55673-89-7	62.5	61	83.2	66.2	26.1	92.6	40.4	77.6	40.3	46	56.83	72.2	45.63	62.89	15.78	25.1%	33
1,2,3,4,7,8,9-HpCDF	39001-02-0	125.0	110	144.1	100	48.7	159.8	81.0	122.6	78.2	108	114.07	131	105.78	123.41	31.65	25.7%	33
Total TcDD	41903-57-5	n.d.	30.1	24.2	19.7	N.D.	25.8	19.3	27	22.01	24.4	19.52	24.62	5.01	20.3%	27		
Total PeCDD	36088-22-9	0.23	69.8	75.9	48.0	N.D.	65.8	45.9	56	51.46	64.9	47.73	62.70	20.99	33.5%	28		
Total HxCDD	34465-46-8	0.26	274.2	178	59.3	N.D.	198.8	147.0	168	171.34	183.9	148.82	177.89	56.97	32.0%	28		
Total HpCDD	37871-00-4	n.d.	84.6	71.2	26.2	N.D.	73.8	45.2	62	85.80	70.6	56.62	65.81	13.75	20.9%	27		
Total TcDF	55722-27-5	0.47	35.2	27.3	19.5	N.D.	30.8	18.3	24	23.82	23.5	21.49	25.82	7.68	29.7%	28		
Total PeCDF	30402-15-4	1.8	162.4	138	105.0	N.D.	143.8	74.1	81	104.96	128.6	106.85	123.56	36.16	29.3%	28		
Total HxCDF	55684-94-1	1.3	299.1	245	85.0	N.D.	276	158.0	235	228.96	224.1	209.3	243.12	78.24	32.2%	28		
Total HpCDF	38998-75-3	n.d.	163.1	129	47.2	N.D.	149.4	82.6	88	112.15	135.7	100.76	124.02	29.82	24.0%	27		

TABLE 1 - SAMPLE 1 (INJECTION STANDARD) in ng/mL, continued

PARAMETER	CAS NO.	DESIGN	99214	99215	99216	99217	99218	99219	99220	99221	99222	99223	99224	MEAN	SD	CV	n
2,3,7,8-TCDD	1746-01-6	25.0	24.1	24.2	23.8	23.2	17.9	20.91	30.8	24	25.0	25.5	19	24.07	4.75	19.8%	34
1,2,3,7,8-PeCDD	+0321-76-4	62.5	64.3	60.1	68.1	59.6	47.1	46.13	69.8	63.7	56.4	66.7	50.2	61.31	12.00	19.6%	34
1,2,3,4,7,8-HxCDD	39227-28-6	62.5	65.8	62.0	64.9	72.2	42.9	39.79	67.4	68	58.2	65.0	51.8	61.07	16.13	26.4%	34
1,2,3,6,7,8-HxCDD	57653-85-7	62.5	66.1	60.5	64.4	72.9	57.0	45.12	75.2	73	64.8	67.4	46	62.32	14.85	23.8%	34
1,2,3,7,8,9-HxCDD	19408-74-3	62.5	64.4	66.5	57.7	62.6	46.8	42.59	69.5	65.3	63.1	69.1	47.4	59.90	13.69	22.9%	34
1,2,3,4,6,7,8-HpCDD	35822-46-9	62.5	64.3	65.6	61.4	70.4	45.8	49.96	74.5	71.2	70.3	65.4	66.9	63.66	12.81	20.1%	34
1,2,3,4,5,6,7,8-OCDD	3268-87-9	125.0	127	135.6	133	139	97.0	82.29	126	153	141	132	104.5	124.29	29.77	24.0%	34
2,3,7,8-TCDF	51207-31-9	25.0	24.6	28.3	27.1	31.2	17.6	42.22	28.0	28.6	25.8	26.5	21.6	26.65	6.11	22.9%	34
1,2,3,7,8-PeCDF	57117-41-6	62.5	63.7	66.5	62.2	75.7	44.9	94.34	60.8	72.3	56.9	66.9	52	64.00	14.89	23.3%	34
2,3,4,7,8-PeCDF	57117-31-4	62.5	64	66.3	69.5	68.9	46.6	102.24	68.2	67.9	55.5	65.7	52.2	63.67	14.71	23.1%	34
1,2,3,4,7,8-HxCDF	70648-26-9	62.5	64.8	63.5	65.1	65.6	44.1	88.36	74.9	66.8	63.3	67.8	49.9	62.16	14.89	24.0%	34
1,2,3,6,7,8-HxCDF	57117-44-9	62.5	64.5	64.0	64.0	67	48.8	91.74	76.6	66.6	59.5	63.9	49	63.15	16.77	26.6%	34
1,2,3,7,8,9-HxCDF	72918-21-9	62.5	62.3	61.6	59.9	67	43.3	105.85	69.7	67.8	57.7	66.0	54	61.15	16.48	26.9%	34
2,3,4,6,7,8-HxCDF	60851-34-5	62.5	63.5	52.4	58.6	64	46.6	121.00	69.7	68.3	70.8	66.2	49.9	61.53	17.51	28.5%	34
1,2,3,4,6,7,8-HpCDF	67562-39-4	62.5	66	69.5	65.8	68.4	47.2	98.49	72.7	63.2	60.6	61.6	56.6	63.40	16.94	26.7%	34
1,2,3,4,7,8,9-HpCDF	55673-89-7	62.5	62.6	53.6	61.0	69.4	46.3	nd	71.4	74.6	60.0	65.6	53.1	62.89	15.78	25.1%	33
1,2,3,4,5,6,7,8-OCDF	39001-02-0	125.0	124	128.3	131	115	87.6	n/a	168	158	129	143	113.4	123.41	31.65	25.7%	33
Total TCDD	41903-57-5		24.1		n/a	23.3	?	20.91	30.8	24	25.0		19	24.62	5.01	20.3%	27
Total PeCDD	36088-22-9	64.3		n/a	60.6	?	46.13	69.8	63.7	56.4		50.2	62.70	20.99	33.5%	28	
Total HxCDD	34465-46-8	196		n/a	208	?	127.50	212	206	186		145.2	177.89	56.97	32.0%	28	
Total HpCDD	37871-00-4	64.3		n/a	73.1	?	49.96	74.5	71.2	70.3		66.9	65.81	13.75	20.9%	27	
Total TCDF	55722-27-5	24.6		n/a	31.9	?	42.22	28.0	28.6	25.8		21.6	25.82	7.68	29.7%	28	
Total PeCDF	30402-15-4	128		n/a	147	?	196.58	130	140	112		104.2	123.56	36.16	29.3%	28	
Total HxCDF	55684-94-1	246		n/a	267	?	406.95	291	270	251		202.7	243.12	78.24	32.2%	28	
Total HpCDF	38998-75-3	128		n/a	137	?	98.49	144	138	121		109.7	124.02	29.82	24.0%	27	
dilution factor													3X				

TABLE 1 - SAMPLE 1 (INJECTION STANDARD) in ng/mL, continued

TABLE 2 - SAMPLE 2 (INJECTION STANDARD) in ng/mL

TABLE 2 - SAMPLE 2 (INJECTION STANDARD) in ng/mL, continued

PARAMETER	CAS NO.	DESIGN	99214	99215	99216	99217	99218	99219	99220	99221	99222	99223	99224	MEAN	SD	CV	n
PCB 77	32598-13-3	500	446	564	509	805	442.0	n/a	n/a to Lab 99220		484	440	427.3	467.98	168.48	36.0%	27
PCB 81	70362-50-4	100	117	110	103	82.5	88.4	n/a	n/a to Lab 99220		94.4	78.0	87.5	148.93	213.64	143.5%	27
PCB 105	32598-14-4	1000	1130	1055	1010	1080	967.2	n/a	n/a to Lab 99220	1080	908	1070	948.6	1043.72	300.33	28.8%	28
PCB 114	74472-37-0	100	114	102	100	129	88.7	n/a	n/a to Lab 99220		80.3	78.3	67.8	104.84	24.73	23.6%	27
PCB 118	31508-00-6	1000	1130	1073	1040	1195	982.8	n/a	n/a to Lab 99220	1035	910	840	618.7	1018.10	324.02	31.8%	28
PCB 123	65510-44-3	100	112	105	100	103	84.6	n/a	n/a to Lab 99220		77.8	240	72.8	109.08	40.34	37.0%	27
PCB 126	57465-28-8	100	102	110	101	111	88.6	n/a	n/a to Lab 99220		91.7	94.5	80.7	102.10	27.81	27.2%	27
PCB 156	38380-08-4	500	575	545	513	570	433.2	n/a	n/a to Lab 99220	595	471	507	438.8	517.96	132.53	25.6%	28
PCB 157	69782-90-7	100	114	111	107	123	86.2	n/a	n/a to Lab 99220		88.2	93.0	89.2	102.04	27.03	26.5%	27
PCB 167	52663-72-6	100	107	115	104	97.5	90.9	n/a	n/a to Lab 99220		89.0	115	87.3	108.16	32.24	29.8%	27
PCB 169	32774-16-6	100	102	112	101	99.7	84.3	n/a	n/a to Lab 99220	115	95.1	107	81	106.57	28.75	27.0%	28
PCB 189	39635-31-9	100	124	108	103	86.5	89.4	n/a	n/a to Lab 99220		83.8	100	70.1	101.27	26.17	25.8%	27
dilution factor														2.4X			

TABLE 2 - SAMPLE 2 (INJECTION STANDARD) in ng/mL, continued

TABLE 3 - SAMPLE 4 (LSBRM9801) in pg/g

PARAMETER	CAS NO.	99201	99203	99204	99205	99206	99207	99208	99209a	99209b	99211	99212	99213	MEAN	SD	CV	n
2,3,7,8-TCDD	1746-01-6	12	15.6	16.60	17.0	19.8	19.3	18.97	19.2	17.4	17.83	20.2	18.02	18.17	2.92	16.1%	35
1,2,3,7,8-PeCDD	40321-76-4	5.9	7.8	7.13	6.57	<2	7.12	8.40	7.58	6.7	7.16	9.1	7.07	8.03	1.46	18.2%	33
1,2,3,4,7,8-HxCDD	39227-28-6	9.3	4.3	8.80	5.98	<10	7.35	8.10	8.58	9.9	8.65	12.6	6.87	11.57	14.49	125.2%	33
1,2,3,6,7,8-HxCDD	57653-85-7	21	15.6	22.50	18.2	<10	17.27	23.45	22.3	20.9	21.30	29.8	18.89	20.90	3.89	18.6%	34
1,2,3,7,8,9-HxCDD	19408-74-3	13	15.5	21.00	17.2	<10	11.17	17.78	16.0	15.4	16.22	18.6	19.11	17.42	3.53	20.2%	33
1,2,3,4,6,7,8-HpCDD	35822-46-9	290	380.0	311.00	288	357.6	276.70	355.65	282	279	300.98	332	308.42	298.74	43.97	14.7%	35
1,2,3,4,5,6,7,8-OcDD	32688-87-9	1900	2216.7	1680.00	1672	2838.9	2055.00	2215.38	1730	1843	1820.08	2303	2065.27	1934.00	280.81	14.5%	35
2,3,7,8-TCDF	51207-31-9	50	61.1	68.90	60.5	70.4	50.75	73.02	58.1	61.6	49.71	53.3	65.59	58.59	9.27	15.8%	35
1,2,3,7,8-PeCDF	57117-41-6	9	11.4	13.30	12.0	27.3	10.12	15.40	10.1	9.7	10.62	14.8	13.47	13.69	4.37	31.9%	35
2,3,4,7,8-PeCDF	57117-31-4	18	33.9	19.80	20.0	27.1	14.40	30.50	16.3	22.8	15.65	20.2	21.59	19.62	5.52	28.1%	35
1,2,3,4,7,8-HxCDF	70648-26-9	52	75.9	75.80	70.0	242.8	53.64	67.36	77.9	70	60.73	76.5	71.9	74.12	32.08	43.3%	35
1,2,3,6,7,8-HxCDF	57117-44-9	14	25.5	21.60	18.0	91.7	17.76	24.54	23.9	16.9	20.03	25.3	18.33	23.23	12.76	54.9%	34
1,2,3,7,8,9-HxCDF	72918-21-9	4.1	6.5	1.17	1.08	97.7	1.59	24.04	1.76	ND(0.600)	6.41	1.6	ND	8.99	17.84	198.3%	30
2,3,4,6,7,8-HpCDF	60851-34-5	11	19.0	12.80	18.5	<10	18.85	6.80	16.8	10.9	15.97	16.5	14.08	15.19	4.81	31.7%	33
1,2,3,4,6,7,8-HpCDF	67562-39-4	260	366.2	278.00	287	512.7	282.37	357.64	258	298	285.19	346	283.53	303.60	48.86	16.1%	35
1,2,3,4,7,8,9-HpCDF	55673-89-7	13	19.9	15.20	15.4	19.6	13.89	13.3	14.3	14.68	17.6	15.7	15.10	3.47	23.0%	33	
1,2,3,4,5,6,7,8-OcDF	39001-02-0	400	515.4	358.00	410	1226.5	499.00	615.93	341	42.7	521.18	613	516.59	513.56	165.93	32.3%	34
Total TCDD	41903-57-5	15	16.6	50.40	62.2	39.8	66.3	58.32	25.6	61.6	59.38	89.9	56.59	56.08	20.80	37.1%	33
Total PeCDD	36088-22-9	64	25.8	94.30	72.8	66.1	79.78	80.27	50.6	66.3	78.57	110	67.88	71.35	26.50	37.1%	33
Total HxCDD	34465-46-8	200	239.6	265.00	214	384.8	183.21	266.24	271	231	238.26	317	225.18	245.87	59.40	24.2%	33
Total HpCDD	37871-00-4	410	829.0	648.00	616	302.4	628.58	766.94	618	607	477.88	710	689.36	596.88	124.04	20.8%	33
Total TCDF	55722-27-5	390	131.7	349.00	347	480.6	380.84	464.93	165	484	653.13	488	377.72	373.67	126.69	33.9%	33
Total PeCDF	30402-15-4	230	208.6	215.00	249	471.5	204.06	259.29	126	227	327.45	268	209.73	230.97	73.26	31.7%	33
Total HxCDF	55684-94-1	140	257.5	302.00	282	373.6	233.24	298.03	226	239	339.12	347	262.5	272.28	61.59	22.6%	33
Total HpCDF	38998-75-3	100	723.1	359.00	468	125.2	373.29	499.70	335	399	392.35	469	414.35	398.14	113.99	28.6%	33

TABLE 3 - SAMPLE 4 (LSBRM9801) in pg/g, continued

PARAMETER	CAS NO.	99201	99203	99204	99205	99206	99207	99208	99209a	99209b	99211	99212	99213	MEAN	SD	CV	n
PCB 77	32598-13-3	1700	1584	1930.00		2052.00		1486	1880	1669.1	1725	2022.74	1779.17	485.29	27.3%	27	
PCB 81	70362-50-4	220	ND	128.00		50.80	163	250	44.97	40.2	125.4	90.53	59.23	65.4%	23		
PCB 105	32598-14-4	4000	4408	6990.00		4768.45	5050	5060	3756.59	3978	3883.56	4075.93	920.66	22.6%	27		
PCB 114	74472-37-0	250	298	322.00		214.20	390	267	190.22	190	137.24	232.38	105.38	45.4%	26		
PCB 118	31508-00-6	6400	9174	13400.00		10955.60	9100	8240	7873.19	8044	7930.46	8227.61	2039.81	24.8%	27		
PCB 123	65510-44-3	300	ND	280.00		390.00	ND(0.90)	150.15	1001	232.57	333.00	332.67	99.9%	23			
PCB 126	57465-28-8	80	63	132.00		93.50	ND(10)	580	89.54	85.2	135.23	108.40	97.15	89.6%	26		
PCB 156	38380-08-4	800	779	1000.00		n/a	839.45	744	898	639.48	560	550.01	695.69	141.69	20.4%	27	
PCB 157	69782-90-7	210	201	137.00		n/a	209.73	274	248	263.97	156	158.98	181.35	46.51	25.6%	26	
PCB 167	52663-72-6	430	359	658.00		n/a	379.37	1910	1770	325.82	299	1529.98	549.92	477.44	86.8%	26	
PCB 169	32774-16-6	9	5	12.30		n/a	9.71	3.6	470	8.56	6.2	<20 (10.39)	41.39	111.57	269.5%	25	
PCB 189	39635-31-9	81	88	89.70		n/a	92.10	ND(30)	ND not measured	76.9	97.79	80.69	17.60	21.8%	23		
<b>Surrogate Recovery</b>																	
PCB 77 C13	105600-23-2	98	55	47.00		85	49.1	78.6	98.1	91	111	90.43	28.28	31.3%	27		
PCB 81 C13	208461-24-9	38	55	89.00		73	48.5	70.5	73.6	94	NA	88.04	30.77	35.0%	22		
PCB 105 C13	208263-62-1	103	50	58.00		60	33.7	59.7	65.5		82.5	86.49	29.25	33.8%	23		
PCB 114 C13	208263-63-2	108	49	78.00		60	38.1	65.7	88.04		80.3	91.34	29.58	32.4%	21		
PCB 118 C13	104130-40-7	143	53	59.00		62	44.8	70.2	88.4		77.9	90.91	29.11	32.0%	24		
PCB 123 C13	208263-64-3	88	47	64.00		61	50	58.3	88.25		NA	88.30	28.62	32.4%	20		
PCB 126 C13	208263-65-4	109	48	56.00		58	41.9	97	72.5		89.5	87.49	36.30	41.5%	27		
PCB 156 C13	208263-68-7	84	49	60.00		53	64.7	42	58.68		103.6	86.66	32.18	37.1%	22		
PCB 157 C13	235416-30-5	89	50	63.00		46	53.8	39.3	87.99		NA	86.79	31.65	36.5%	20		
PCB 167 C13	208263-69-8	92	48	74.00		42	49.6	51.6	84.33		94.2	86.74	32.34	37.3%	20		
PCB 169 C13	208263-70-1	108	49	59.00		50	43.1	50.5	71.6		100.9	84.37	32.69	38.7%	25		
PCB 189 C13	208263-73-4	57	50	98.00		29	54.1	48.6	impure		83.98	29.22	34.8%	22			
PCB 180 C13											94	87.20	6.80	7.8%	2		
PCB 170 C14													101.6				

TABLE 3 - SAMPLE 4 (LSBRM19801) in pg/g, continued

PARAMETER	CAS NO.	99214	99215	99216	99217	99218	99219	99220	99221	99222	99223	99224a	99224b	MEAN	SD	CV	n
2,3,7,8-TCDD	1746-01-6	18	19.3	20.0	17.9	22.1	23.62	17.3	17	18.3	21.8	13.7	14.3	18.17	2.92	16.1%	35
1,2,3,7,8-PeCDD	40321-76-4	9.23	10.5	9.72	9.06	8.8	9.55	5.92	7.35	7.8	7.89	7.7	7.2	8.03	1.46	18.2%	33
1,2,3,4,7,8-HxCDD	39227-28-6	10.80	9.3	12.1	8.9	92.9	9.2	9.35	10.3	9.7	9.51	6.7	6.5	11.57	14.49	125.2%	33
1,2,3,6,7,8-HxCDD	57653-85-7	27.30	22.5	21.6	22.7	20.2	28.55	18.7	20.9	21.3	22.6	16.7	17.2	20.90	3.89	18.6%	34
1,2,3,7,8,9-HxCDD	19408-74-3	21.40	17.7	18.6	16.8	16.5	19.26	20.9	21.4	15.6	20.3	12	11.9	17.42	3.53	20.2%	33
1,2,3,4,6,7,8-HpCDD	35822-46-9	319	277	342	294	148.3	416.64	275	302	324	308	273.1	276.0	298.74	43.97	14.7%	35
1,2,3,4,5,6,7,8-OCDD	3268-87-9	1970	1852	2350	1980	2001.8	2188.51	1560	1980	1925	2000	1503.8	1482.9	1934.00	280.81	14.5%	35
2,3,7,8-TCDF	51207-31-9	58.8	60.4	63.7	55.1	54.3	58.98	61.0	78.2	63.0	51.4	43.9	43.6	58.59	9.27	15.8%	35
1,2,3,7,8-PeCDF	57117-41-6	21.1	16.0	12.0	12.8	9.7	26.13	(6.47)	12.3	14.6	14.9	10.1	10.8	13.69	4.37	31.9%	35
2,3,4,7,8-PeCDF	57117-31-4	20.1	19.5	18.2	18.6	1.8	20.28	17.3	17	20.9	12.7	14.9	15.2	19.62	5.52	28.1%	35
1,2,3,4,7,8-HxCDF	70648-26-9	64.1	56.7	121	74.5	66.0	74.17	72.5	82	88.2	64.5	48.3	47.0	74.12	32.08	43.3%	35
1,2,3,6,7,8-HxCDF	57117-44-9	24.6	33.2	33.0	19.9	22.2	24.19	16.9	18.6	24.3	22.5	15.6	14.3	23.23	12.76	54.9%	34
1,2,3,7,8,9-HxCDF	72918-21-9	4.20	4.3	1.38	1.63	0.4	11.05	11.3	1.31	<LD (1.74)	<5	1.1	1.1	8.99	17.84	198.3%	30
2,3,4,6,7,8-HxCDF	60851-34-5	20.3	15.5	17.5	13.6	20.6	nd	(18.6)	21.7	16.1	15.6	11.4	11.6	15.19	4.81	31.7%	33
1,2,3,4,6,7,8-HpCDF	67562-39-4	339	297	358	296	292.9	366.23	280	272	298	267	256.2	252.0	303.60	48.86	16.1%	35
Total TCDD	41903-57-5	93.2	-	n/a	19.2	88	23.62	33.3	59	55.7	79.3	44.2	52.3	56.08	20.80	37.1%	33
Total PeCDD	36088-22-9	113	-	n/a	46.4	69	9.55	25.3	78.1	85.9	86	71.6	64.5	71.35	26.50	37.1%	33
Total HxCDD	34465-46-8	306	-	n/a	242	343	57.01	252	219	274	320	195.3	178.6	245.87	59.40	24.2%	33
Total HpCDD	37871-00-4	649	-	n/a	617	726	416.64	601	629	711	671	401.8	574.1	596.88	124.04	20.8%	33
Total TCDF	55722-27-5	462	-	n/a	102	490	58.98	553	410	353	355	247.8	262.8	373.67	126.69	33.9%	33
Total PeCDF	30402-15-4	315	-	n/a	108	122	46.41	288	220	256	223	181.7	176.4	230.97	73.26	31.7%	33
Total HxCDF	55684-94-1	357	-	n/a	219	192	109.41	271	280	313	353	217.4	207.1	272.28	61.59	22.6%	33
Total HpCDF	38998-75-3	498	-	n/a	411	473	368.27	441	401	444	377	370.7	357.6	398.14	113.99	28.6%	33

TABLE 3 - SAMPLE 4 (LSBRM19801) in pg/g, continued

PARAMETER	CAS NO.	99214	99215	99216	99217	99218	99219	99220	99221	99222	99223	99224a	99224b	MEAN	SD	CV	n
PCB 77	32598-13-3	1860		1840	1920	2648.6	1945.82	n/a to Lab 99220		1755	1270	1355.1	1449.3	1779.17	485.29	27.3%	27
PCB 81	70362-50-4	18.1		78.1	<50	58.6	n/a	n/a to Lab 99220		34.5	94	129.8	131.9	90.53	59.23	65.4%	23
PCB 105	32598-14-4	4210		3820	4240	5264.0	n/a	n/a to Lab 99220	3780	3852	3390	3326.6	3488.8	4075.93	920.66	22.6%	27
PCB 114	74472-37-0	244		167	202	297.9	n/a	n/a to Lab 99220		168	150	122.9	117.3	232.38	105.38	45.4%	26
PCB 118	31508-00-6	9040		7790	11700	11005.2	n/a	n/a to Lab 99220	6880	8225	6930	4756.2	5112.7	8227.61	2039.81	24.8%	27
PCB 123	65510-44-3	287		233	1260	422.8	n/a	n/a to Lab 99220		180	250	75.2	57.2	3333.00	3322.67	99.9%	23
PCB 126	57465-28-8	94.3		120	66.5	77.8	121.44	n/a to Lab 99220		87.8	59	82.2	91.1	108.40	97.15	89.6%	26
PCB 156	38380-08-4	746		710	812	853.9	n/a	n/a to Lab 99220	698	712	520	572.5	600.2	695.69	141.69	20.4%	27
PCB 157	69782-90-7	200		190	207	222.2	n/a	n/a to Lab 99220		174	119	151.1	145.2	181.35	46.51	25.6%	26
PCB 167	52663-72-6	361		325	308	396.9	n/a	n/a to Lab 99220		293	1240	254.6	280.3	549.92	477.44	86.8%	26
PCB 169	32774-16-6	7.98		5.90	4.56	11.4	8.65	n/a to Lab 99220	ND	7.08	<20	14.9	12.2	41.39	111.57	269.5%	25
PCB 189	39635-31-9	91.5		84.4	55	103.5	n/a	n/a to Lab 99220		82.4	40	57.9	63.1	80.69	17.60	21.8%	23
Surrogate Recovery																	
PCB 77 C13	105600-23-2	99		108	92.5	94.9	55	n/a to Lab 99220		88	70	178.48	121.6	90.43	28.28	31.3%	27
PCB 81 C13	208461-24-9	98		114	131.7	99.2	n/a	n/a to Lab 99220		xx	93	178.37	114.8	88.04	30.77	35.0%	22
PCB 105 C13	208263-62-1	89		68	70.7	90.7	n/a	n/a to Lab 99220	102	84	98	181.25	117.6	86.49	29.25	33.8%	23
PCB 114 C13	208263-63-2	90		76	131.7	97.7	n/a	n/a to Lab 99220	105	88	182.71	108.1	91.34	29.58	32.4%	21	
PCB 118 C13	104130-40-7	88		86	131.7	87.9	n/a	n/a to Lab 99220	102	72	67	179	103.5	90.91	29.11	32.0%	24
PCB 123 C13	208263-64-3	88		82	131.7	97.3	n/a	n/a to Lab 99220	107	xx	71	176.53	104.4	88.30	28.62	32.4%	20
PCB 126 C13	208263-65-4	95		31	150	99.9	34	n/a to Lab 99220	106	97	63	203.10	131.4	87.49	36.30	41.5%	27
PCB 156 C13	208263-68-7	91		92	82.9	102.6	n/a	n/a to Lab 99220		65		198.49	124.5	86.66	32.18	37.1%	22
PCB 157 C13	235416-30-5	90		89	82.9	105.0	n/a	n/a to Lab 99220		94		186.69	118.5	86.79	31.65	36.5%	20
PCB 167 C13	208263-69-8	93		92	118	96.5	n/a	n/a to Lab 99220		73		197.21	103.2	86.74	32.34	37.3%	20
PCB 169 C13	208263-70-1	90		60	129	66.7	34	n/a to Lab 99220		100	89	179.26	126.9	84.37	32.69	38.7%	25
PCB 189 C13	208263-73-4	84		73	101.8	100.7	n/a	n/a to Lab 99220		94	103	167.29	97.3	83.98	29.22	34.8%	22
PCB 180 C13															87.20	6.80	7.8%

TABLE 3 - SAMPLE 4 (LSBRM9801) in pg/g, continued

PARAMETER	CAS NO.	99225	99226	99228	99229	99230	99231	99232	99233	99234	99235	99336	MEAN	SD	CV	n	
2,3,7,8-TCDD	1746-01-6	22.64	16.5	15.8	15.2	13	19.50	18.7	17.7	18.0	26.632	17.1	18.17	2.92	16.1%	35	
1,2,3,7,8-PeCDD	40321-76-4	9.12	8.37	7.8	not found	6.6	3.91	10.4	8.08	8.70	9.904	10.7	8.03	1.46	18.2%	33	
1,2,3,4,7,8-HxCDD	39227-28-6	8.64	7.47	8.9	not found	12	13.10	9.44	8.1	9.30	9.908	9.41	11.57	14.49	125.2%	33	
1,2,3,6,7,8-HxCDD	57653-85-7	21.92	19.3	21.8	8.0	16	22.40	21.8	22.1	20.0	25.794	19.9	20.90	3.89	18.6%	34	
1,2,3,7,8,9-HxCDD	19408-74-3	25.92	13.9	22.8	not found	14	12.80	23.5	18.7*	16.0	19.76	14.3	17.42	3.53	20.2%	33	
1,2,3,4,6,7,8-HpCDD	35822-46-9	299.04	259	292	264.1	230	270.00	311	290	290	333.554	301	298.74	43.97	14.7%	35	
1,2,3,4,5,6,7,8-OcDD	3268-87-9	1745.76	1840	1830	1544.7	1500	1760.00	2110	1960	1900	2336.392	2030	1934.00	280.81	14.5%	35	
2,3,7,8-TCDF	51207-31-9	51.44	56.3	67.1	46.4	47	53.60	80.9	48.1*	60.0	72.538	52.1	58.59	9.27	15.8%	35	
1,2,3,7,8-PeCDF	57117-41-6	13.76	15.4	{18.7}	7.9	16	15.40	10.6	13.8	12.0	15.022	15.9	13.69	4.37	31.9%	35	
2,3,4,7,8-PeCDF	57117-31-4	22.32	27.6	21.2	17.1	13	18.30	19.8	20.3*	20.0	26.462	24.0	19.62	5.52	28.1%	35	
1,2,3,4,7,8-HxCDF	70648-26-9	84.4	61.7	83.7	51.6	54	61.30	80.3	59.1*	75.0	69.572	59.9	74.12	32.08	43.3%	35	
1,2,3,6,7,8-HxCDF	57117-44-9	22.08	23.1	20.7	11.9	18	18.00	20.1	24.1	22.0	23.09	ND(1)	23.23	12.76	54.9%	34	
1,2,3,7,8,9-HxCDF	72918-21-9	20.72	6.20	19.1	not found	2.8	1.99	1.51	DPE (23.5)	<2	2.392	6.11	8.99	17.84	198.3%	30	
2,3,4,6,7,8-HxCDF	60851-34-5	3.28	14.9	{4.0}	10.3	13	17.00	13.6	23.5	16.0	24.402	17.5	15.19	4.81	31.7%	33	
1,2,3,4,6,7,8-HpCDF	67562-39-4	313.92	325	308	280.1	220	295.00	310	286	290	313.05	296 P(2)	303.60	48.86	16.1%	35	
1,2,3,4,7,8,9-HpCDF	55673-89-7	13.84	18.0	15.8	not found	16	14.90	15.3	16.2	14.0	16.872	15.0	15.10	3.47	23.0%	33	
1,2,3,4,5,6,7,8-OcDF	39001-02-0	507.52	537	491	419.3	420	480.00	565	549	500	501.64	434	513.56	165.93	32.3%	34	
Total TCDD		41903-57-5	68.8	52.6	52.1	42.9	46	76.50	69.8	67.7	64.0	79.396	81.5	56.08	20.80	37.1%	33
Total PeCDD		36088-22-9	22.24	88.0	103	52.0	73	54.70	127	57.7	68.0	104.324	99.3	71.35	26.50	37.1%	33
Total HxCDD		34465-46-8	292.24	211	265	184.2	200	217.00	236	245	240	342.054	259	245.87	59.40	24.2%	33
Total HpCDD		37871-00-4	681.28	542	292	565.8	470	553.00	646	609	620	744.218	674	596.88	124.04	20.8%	33
Total TCDF		55722-27-5	410.24	422	352	282.9	510	296.00	447	400	380	422.02	402	373.67	126.69	33.9%	33
Total PeCDF		30402-15-4	316.56	276	191	222.6	220	292.00	231	252	210	261.97	217	230.97	73.26	31.7%	33
Total HxCDF		55684-94-1	318.96	278	272	273.6	280	243.00	279	266	290	408.264	258	272.28	61.59	22.6%	33
Total HpCDF		38998-75-3	462.4	460	415	451.5	320	400.00	463	387	460	412.63	108	398.14	113.99	28.6%	33

TABLE 3 - SAMPLE 4 (LSBRM9801) in pg/g, continued

PARAMETER	CAS NO.	99225	99226	99228	99229	99230	99231	99232	99233	99234	99235	99336	MEAN	SD	CV	n
PCB 77	32598-13-3	1825	1540	660	1300	2110.00	3490	1530	1600			1890	1779.17	485.29	27.3%	27
PCB 81	70362-50-4	< 10	96.6	70	45	121.00	51.1	40.7	45.0			45.3	90.53	59.23	65.4%	23
PCB 105	32598-14-4	4454	3660	1500	3300	4300.00	4410	3520	3300			4340	4075.93	920.66	22.6%	27
PCB 114	74472-37-0	212	256	640	120	286.00	252	171	170			207	232.38	105.38	45.4%	26
PCB 118	31508-00-6	8909	8510	3400	7300	8490.00	8880	7500	7500			9100	8227.61	2039.81	24.8%	27
PCB 123	65510-44-3	1187	185	110	19	147.00	175	180	320			217	333.00	332.67	99.9%	23
PCB 126	57465-28-8	111	86.1	30	82	69.20	123	86	80.0			92.4	108.40	97.15	89.6%	26
PCB 156	38380-08-4	789	625	280	670	689.00	720	604	560			812	695.69	141.69	20.4%	27
PCB 157	69782-90-7	204	149	60	140	168.00	218	161	140			208	181.35	46.51	25.6%	26
PCB 167	52663-72-6	405	290	140	290	332.00	732	296	330			363	549.92	477.44	86.8%	26
PCB 169	32774-16-6	362	7.40	-10	19	6.86	10.5	6.18	6.60			9.14	41.39	111.57	269.5%	25
PCB 189	39635-31-9	118	84.0	50	80	81.00	90.9	73.2	79.0			96.5	80.69	17.60	21.8%	23
Surrogate Recovery																
PCB 77 C13	105600-23-2	88	125	118	97	93.00	61.44	109	46			83.6	90.43	28.28	31.3%	27
PCB 81 C13	208461-24-9	88	NA		98	93.00	65.66	103	41			77.2	88.04	30.77	35.0%	22
PCB 105 C13	208263-62-1	80	112		-	97.91	115	84				87.4	86.49	29.25	33.8%	23
PCB 114 C13	208263-63-2	80	NA		-	92.00	111.60	105	83			NA(3)	91.34	29.58	32.4%	21
PCB 118 C13	104130-40-7	82	109		-	89.00	101.73	109	83			92.9	90.91	29.11	32.0%	24
PCB 123 C13	208263-64-3	81	NA		94	-	96.08	98	83			NA(3)	88.30	28.62	32.4%	20
PCB 126 C13	208263-65-4	88	79.5	101	99	98.00	62.86	111	54			86.8	87.49	36.30	41.5%	27
PCB 156 C13	208263-68-7	83	104		-	102.00	85.18	108	73			79.8	86.66	32.18	37.1%	22
PCB 157 C13	235416-30-5	77	100		-	117.00	69.78	99	78			NA(3)	86.79	31.65	36.5%	20
PCB 167 C13	208263-69-8	83	NA		88	-	76.24	107	72			NA(3)	86.74	32.34	37.3%	20
PCB 169 C13	208263-70-1	81	111	106	97	-	57.66	105	57			87.7	84.37	32.69	38.7%	25
PCB 189 C13	208263-73-4	78	99.4		86	109.00	69.23	116	81			51.0	83.98	29.22	34.8%	22
PCB 180 C13													87.20	6.80	7.8%	2

TABLE 4 - SAMPLE 5 (NWRI - DX-3) in pg/g

PARAMETER	CAS NO.	99201	99203	99204	99205	99206	99207	99208	99209a	99209b	99211	99212	99213	MEAN	SD	CV	n
2,3,7,8-TCDD	1746-01-6	110	112.2	105.00	128	91	126.3	136.96	88.1	98.6	114.25	135	124.00	122.19	20.70	16.9%	35
1,2,3,7,8-PeCDD	40321-76-4	14	21.6	18.10	17.8	5.4	16.30	20.83	16.7	16.87	21.7	18.46	18.80	3.87	20.6%	35	
1,2,3,4,7,8-HxCDD	39227-28-6	29	12.3	18.60	16.1	12.2	16.34	19.19	20.8	20.3	19.23	22.4	16.86	27.31	23.53	86.2%	35
1,2,3,6,7,8-HxCDD	57653-85-7	59	43.6	60.20	56.6	44.6	75.21	67.32	66.9	57.6	57.66	71.1	68.26	59.42	8.17	13.8%	35
1,2,3,7,8,9-HxCDD	19408-74-3	15	20.2	41.20	39.3	28.5	33.42	40.03	49.5	41.1	33.36	40.3	49.90	36.40	8.17	22.4%	35
1,2,3,4,6,7,8-HpCDD	35822-46-9	490	617.2	463.00	479	608.0	590.29	617.28	516	473	488.57	542	501.90	502.95	60.47	12.0%	35
1,2,3,4,5,6,7,8-OCDD	3268-87-9	3000	3339.1	3530.00	2709	3726.2	3425.00	3626.54	3470	2633	2653.36	4120	3404.88	3070.44	403.11	13.1%	35
2,3,7,8-TCDF	51207-31-9	35	42.1	72.00	82.7	15.7	40.11	54.21	68.3	71.2	38.32	43.3	47.22	48.92	17.09	34.9%	35
1,2,3,7,8-PeCDF	57117-41-6	23	33	40.80	36.5	30.8	25.49	38.68	86.8	28.3	31.60	39.8	32.65	39.99	17.08	42.7%	35
2,3,4,7,8-PeCDF	57117-31-4	43	76.4	46.90	54.5	10.0	33.00	76.39	36.8	42.3	39.73	50.6	42.58	48.10	13.26	27.6%	35
1,2,3,4,7,8-HxCDF	70648-26-9	370	622.9	435.00	424	1211.8	370.94	477.43	512	418	400.41	410	407.76	469.71	149.54	31.8%	35
1,2,3,6,7,8-HxCDF	57117-44-9	68	124.6	96.10	83.3	431.7	82.37	110.92	136	88.3	92.36	105	76.55	105.27	61.94	58.8%	34
1,2,3,7,8,9-HxCDF	72918-21-9	24	55.2	3.74	3.89	56.8	10.38	51.50	NDE (10)	4.32	30.63	7.1	4.08	24.62	25.04	101.7%	33
2,3,4,6,7,8-HxCDF	60851-34-5	8	49	32.00	55.2	60.7	39.07	37.04	67.4	33.7	36.40	36.3	29.40	39.78	15.37	38.6%	34
1,2,3,4,6,7,8-HpCDF	67562-39-4	1700	2171.1	1620.00	1933	4170.8	1840.40	2430.56	169	188	1755.10	2177	1720.32	1858.34	632.12	34.0%	35
1,2,3,4,7,8,9-HpCDF	55673-89-7	94	120.1	89.10	132	152.8	92.17	121.53	78.3	108	93.30	96.1	99.87	95.35	24.85	26.1%	35
1,2,3,4,5,6,7,8-OCDF	39001-02-0	3100	3499.6	4190.00	3317	7050	3917.50	4880.40	4020	3260	3488.52	4983	4354.55 E	3980.34	792.92	19.9%	34
Total TCDD	41903-57-5	130	113.0	187.00	284	189.8	293.8	286.46	229	201	262.76	350	295.73	251.52	71.22	28.3%	33
Total PeCDD	36088-22-9	200	92.2	219.00	216	260.3	286.00	206.40	16.7	150	176.98	314	211.48	206.90	99.19	47.9%	33
Total HxCDD	34465-46-8	590	477.6	550.00	514	779.6	560.50	582.56	343	515	488.49	682	560.53	549.28	124.30	22.6%	33
Total HpCDD	37871-00-4	480	1251.5	937.00	959	583.4	1168.00	1176.70	1000	917	915.49	1043	1028.97	923.57	160.44	17.4%	33
Total TCDF	55722-27-5	670	111.5	375.00	556	1013.9	526.00	651.04	1700	531	571.07	787	533.98	611.54	327.11	53.5%	33
Total PeCDF	30402-15-4	610	371.4	537.00	699	1593.8	478.50	708.91	937	503	484.69	796	524.70	642.77	272.84	42.4%	33
Total HxCDF	55684-94-1	610	1786.3	1190.00	1208	1453.5	1130.00	1408.18	183	1070	1197.53	1461	1068.49	1227.31	332.20	27.1%	33
Total HpCDF	38998-75-3	400	4169.2	1950.00	3037	885.7	2489.00	3105.71	2210	2320	2305.02	2669	2320.22	2316.17	726.15	31.4%	33

TABLE 4 - SAMPLE 5 (NWRI - DX-3) in pg/g, continued

PARAMETER	CAS NO.	99201	99203	99204	99205	99206	99207	99208	99209a	99209b	99211	99212	99213	MEAN	SD	CV	n
PCB 77	32598-13-3	2600	972	3030.00		3053.90		2450	4600	2512.62	2750	3317.63	2701.40	899.28	33.3%	27	
PCB 81	70362-50-4	420	ND	344.00		60.40		477	0.278	57.11	58.4	311.75	158.90	131.58	82.8%	23	
PCB 105	32598-14-4	6000	3040	10900.00		7143.97		7370	7400	5692.04	5990	6064.47	6047.97	1480.71	24.5%	27	
PCB 114	74472-37-0	480	156	993.00		321.05		652	537	263.38	283	265.09	367.78	233.58	63.5%	26	
PCB 118	31508-00-6	11000	6728	22100.00		16858.00		23100	14100	13242.66	14790	12830.67	13754.94	4197.07	30.5%	27	
PCB 123	65510-44-3	730	ND	561.00		641.70		ND(30)	523	379.72	1600	663.59	711.76	568.68	79.9%	24	
PCB 126	57465-28-8	100	14	192.00		106.45		ND(10)	176	102.77	86	180.72	107.67	40.57	37.7%	26	
PCB 156	38380-08-4	1500	519	1720.00		545.3	1284.50		1470	1300	1031.69	943	901.92	1107.20	286.60	25.9%	28
PCB 157	69782-90-7	430	140	297.00		102.5	365.87		500	474	530.45	279	312.05	326.45	104.73	32.1%	27
PCB 167	52663-72-6	840	284	1210.00		100.4	697.03		3840	1100	633.72	508	3189.92	921.00	865.53	94.0%	27
PCB 169	32774-16-6	21	3	<70		97.9	12.67		156	200	15.65	13.5	35.68=DL	55.91	124.95	223.5%	26
PCB 189	39635-31-9	290	90	245.00		104.4	192.60		179	2100	197.68	202	288.90	279.57	378.82	135.5%	27
Surrogate Recovery																	
PCB 77 C13	105600-23-2	87	58	37.00		94		65.2	40.3	98.00	84	90.40	86.36	24.55	28.4%	27	
PCB 81 C13	208461-24-9	62	58	68.00		79		61.3	45	88.50	90	NA	85.39	25.70	30.1%	22	
PCB 105 C13	208263-62-1	113	55	44.00		72		38	49.6	75.53		101.10	84.59	26.57	31.4%	23	
PCB 114 C13	208263-63-2	115	52	52.00		62		35.7	42.3	74.34		94.80	83.54	28.57	34.2%	21	
PCB 118 C13	104130-40-7	151	59	49.00		69		50.6	55.1	73.59		91.60	86.11	27.24	31.6%	24	
PCB 123 C13	208263-64-3	100	52	52.00		63		42.1	46.2	73.84		NA	80.48	26.56	33.0%	20	
PCB 126 C13	208263-65-4	117	52	35.00		61		30.6	43.2	96.90		104.20	85.65	31.18	36.4%	27	
PCB 156 C13	208263-68-7	110	59	25.00		51		45	31.2	82.98		99.80	80.62	27.98	34.7%	22	
PCB 157 C13	235416-30-5	118	63	24.00		43		45.7	37	78.57		NA	81.62	28.62	35.1%	20	
PCB 167 C13	208263-69-8	112	60	31.00		41		42.4	40.6	75.71		86.30	80.33	29.02	36.1%	20	
PCB 169 C13	208263-70-1	119	65	23.00		43		65.6	34.3	124.40		101.60	81.73	31.95	39.1%	25	
PCB 189 C13	208263-73-4	91	65	107.00		23		61.1	46	51.98		80.56	28.84	35.8%	23		
PCB 180 C14												92.80	92.00	0.80	0.9%	2	
PCB 170 C14												87.70					

TABLE 4 - SAMPLE 5 (NWRI - DX-3) in pg/g, continued

PARAMETER	CAS NO.	9921	99215	9921	99218	99219	99220	9922	99222	99224	MEAN	SD	CV	n			
2,3,7,8-TCDD	1746-01-6	133	125,000	154	128	144.4	164.1	141	110	122	147	94.8	94.3	122.19	20.70	16.9%	35
1,2,3,7,8-PeCDD	40321-76-4	20.6	21,000	20.5	19.7	21.4	23.06	15.8	15.7	19.9	21.5	15.5	18.80	3.87	20.6%	35	
1,2,3,4,7,8-HxCDD	39227-28-6	25.3	23,100	24.5	20.8	23.5	25.91	(17.1)	23.2	22.4	19.3	16.7	15.8	27.31	23.53	86.2%	35
1,2,3,6,7,8-HxCDD	57653-85-7	67.5	61,300	62.1	60.6	52.8	75.73	68.1	61.2	59.3	58.3	47.2	43.9	59.42	8.17	13.8%	35
1,2,3,7,8,9-HxCDD	19408-74-3	41.5	41,300	33.0	33.7	36.5	41.03	40.8	43.7	40.4	43.2	27.8	28.3	36.40	8.17	22.4%	35
1,2,3,4,6,7,8-HpCDD	35822-46-9	498	489,000	586	478	477.3	615.58	523	498	545	508	442.8	441.3	502.95	60.47	12.0%	35
1,2,3,4,5,6,7,8-OCD	3268-87-9	3150	3064,00	3420	3020	3157.0	3198.8	2890	3200	3127	2880	2369.2	2457.1	3070.44	403.11	13.1%	35
2,3,7,8-TCDF	51207-31-9	54.5	38,500	44.5	44.7	36.0	43.71	70.6	79.6	50.2	38.7	32.2	33.4	48.92	17.09	34.9%	35
1,2,3,7,8-PeCDF	57117-41-6	48.9	39,400	44.1	33.6	32.5	104.22	32.7	41.4	38.3	43.4	15.4	19.4	39.99	17.08	42.7%	35
2,3,4,7,8-PeCDF	57117-31-4	45.5	52,000	52.6	47.1	45.9	46.27	47.7	37	49.6	32.2	41.1	39.5	48.10	13.26	27.6%	35
1,2,3,4,7,8-HxCDF	70648-26-9	403	409,000	647	482	489.7	487.38	614	509	540	402	318.8	344.9	469.71	149.54	31.8%	35
1,2,3,6,7,8-HxCDF	57117-44-9	104	145,000	125	95.8	98.4	116.25	137	11.8	116	96.6	73.5	68.0	105.27	61.94	58.8%	34
1,2,3,7,8,9-HxCDF	72918-21-9	5.00	32,600	3.94	5.01	5.8	74.39	98.0	3.14	<LD	<8	3.5	3.8	24.62	25.04	101.7	33
2,3,4,6,7,8-HxCDF	60851-34-5	38.5	34,100	49.0	32.5	51.6	39.77	66.0	60.3	36.4	33.5	26.1	25.9	39.78	15.37	38.6%	34
1,2,3,4,6,7,8-HpCDF	67562-39-4	2100	2078,00	2310	1920	2029.0	2280.6	2450	1770	2042	1790	1772.4	1683.5	1858.34	632.12	34.0%	35
1,2,3,4,7,8,9-HpCDF	55673-89-7	108	82,900	111	124	104.1	16.1	77.7	111	95.7	105	76.4	63.2	95.35	24.85	26.1%	35
1,2,3,4,5,6,7,8-OCDF	39001-02-0	3900	3605,00	5190	3980	4321.7	n/a	4740	4330	4169	4280	3440.9	3205.6	3980.34	792.92	19.9%	34
Total TCDD	41903-57-5	320	-	n/a	132	309	164.10	294	139	239	283	203.3	238.2	251.52	71.22	28.3%	33
Total PeCDD	36088-22-9	262	-	n/a	277	202	23.06	114	178	227	263	197.4	166.2	206.90	99.19	47.9%	33
Total HxCDD	34465-46-8	837	-	n/a	528	585	142.67	591	525	599	620	434	387.9	549.28	124.30	22.6%	33
Total HpCDD	37871-00-4	922	-	n/a	956	929	615.58	1020	935	1080	960	834.7	834.3	923.57	160.44	17.4%	33
Total TCDF	55722-27-5	646	-	n/a	117	808	43.71	1480	484	448	572	382.1	336.7	611.54	327.11	53.5%	33
Total PeCDF	30402-15-4	662	-	n/a	407	573	150.49	1120	598	699	668	244	350.3	642.77	272.84	42.4%	33
Total HxCDF	55684-94-1	1120	-	n/a	1290	927	717.79	1970	1340	1441	1620	1121.9	989.5	1227.31	332.20	27.1%	33
Total HpCDF	38998-75-3	2790	-	n/a	2500	2715	2296.7	3260	2380	2689	2240	2287.5	2136.1	2316.17	726.15	31.4%	33

TABLE 4 - SAMPLE 5 (NWRI - DX-3) in pg/g, continued

PARAMETER	CAS NO.	99214	99215	99216	99217	99218	99219	99220	99221	99222	99223	99224a	99224b	MEAN	SD	CV	n	
PCB 77	32598-13-3	2810	2740	2260	4887.4	2525.83	n/a to Lab 99220	2673	2010	2300.9	2223.4	2701.40	899.28	33.3%	27			
PCB 81	70362-50-4	35.1	161	<50	94.3	n/a	n/a to Lab 99220	50.1	182	262.3	269.1	158.90	131.58	82.8%	23			
PCB 105	32598-14-4	6330	5830	7070	5452.7	n/a	n/a to Lab 99220	6020	5974	6030	5668.6	5315.5	6047.97	1480.71	24.5%	27		
PCB 114	74472-37-0	417	254	324	384.8	n/a	n/a to Lab 99220	274	195	203.9	184.1	367.78	233.58	63.5%	26			
PCB 118	31508-00-6	15300	13000	21100	19832.4	n/a	n/a to Lab 99220	9900	14089	11600	9069.9	8460.8	13754.9	4197.07	30.5%	27		
PCB 123	65510-44-3	541	624	2150	576.8	n/a	n/a to Lab 99220	338	522	243.1	169.3	711.76	568.68	79.9%	24			
PCB 126	57465-28-8	114	139	76.2	86.2	121.79	n/a to Lab 99220	102	61.8	112.2	109.8	107.67	40.57	37.7%	26			
PCB 156	38380-08-4	1210	1210	1230	1360.2	n/a	n/a to Lab 99220	1150	1222	988	991.3	962.8	1107.20	286.60	25.9%	28		
PCB 157	69782-90-7	376	389	344	427.6	n/a	n/a to Lab 99220	327	261	307.4	280.3	326.45	104.73	32.1%	27			
PCB 167	52663-72-6	658	560	548	764.0	n/a	n/a to Lab 99220	541	2600	519.5	478.5	921.00	865.53	94.0%	27			
PCB 169	32774-16-6	14.9	14.7	16.1	24.6	12.86	n/a to Lab 99220	40.2	12.0	<20	17.6	15.9	55.91	124.95	223.5	26		
PCB 189	39635-31-9	225	156	113	802.0	n/a	n/a to Lab 99220	162	131	150.7	139.0	279.57	378.82	135.5	27			
<b>Surrogate Recovery</b>																		
PCB 77 C13	105600-23-2	95	133.5	82.4	94.0	79	n/a to Lab 99220	84	76	143.68	109.4	86.36	24.55	28.4%	27			
PCB 81 C13	208461-24-9	94	122.0	139	78.7	n/a	n/a to Lab 99220	xx	93	140.70	104.1	85.39	25.70	30.1%	22			
PCB 105 C13	208263-62-1	81	54.9	69	105.6	n/a	n/a to Lab 99220	89	87	146.50	112.6	84.59	26.57	31.4%	23			
PCB 114 C13	208263-63-2	82	69.5	139	90.9	n/a	n/a to Lab 99220	96	90	142.89	113.5	83.54	28.57	34.2%	21			
PCB 118 C13	104130-40-7	81	84.4	139	71.0	n/a	n/a to Lab 99220	84	85	67	138.18	107.0	86.11	27.24	31.6%	24		
PCB 123 C13	208263-64-3	82	83.8	139	91.0	n/a	n/a to Lab 99220	94	xx	70	138.67	109.1	80.48	26.56	33.0%	20		
PCB 126 C13	208263-65-4	87	149.1	89.4	98.6	50	n/a to Lab 99220	92	94	61	153.92	122.4	85.65	31.18	36.4%	27		
PCB 156 C13	208263-68-7	81	91.0	80.6	85.7	n/a	n/a to Lab 99220	63		146.06	114.4	80.62	27.98	34.7%	22			
PCB 157 C13	235416-30-5	78	84.2	80.6	88.2	n/a	n/a to Lab 99220	94		143.43	109.4	81.62	28.62	35.1%	20			
PCB 167 C13	208263-69-8	77	91.1	121	80.7	n/a	n/a to Lab 99220	72		143.44	112.3	80.33	29.02	36.1%	20			
PCB 169 C13	208263-70-1	75	33.1	55.2	95.3	54	n/a to Lab 99220	96	88	141.31	123.8	81.73	31.95	39.1%	25			
PCB 189 C13	208263-73-4	79	87.9	123	44.7	n/a	n/a to Lab 99220	87	111	129.33	105.3	80.56	28.84	35.8%	23			
PCB 180 C13												92.00	0.80	0.9%	2			

TABLE 4 - SAMPLE 5 (NWRI - DX-3) in pg/g, continued

PARAMETER	CAS NO.	99225	99226	99228	99229	99230	99231	99232	99233	99234	99235	MEAN	SD	CV	n
2,3,7,8-TCDD	1746-01-6	129.1	109	110	121.8	88	119.00	136	125	110	179.66	122	122.19	20.70	16.9%
1,2,3,7,8-PeCDD	40321-76-4	20.96	19.1	18.4	14.3	14	16.10	28.4	21.5	19.0	22.71	24.7	18.80	3.87	20.6%
1,2,3,4,7,8-HxCDD	39227-28-6	58.48	36.4	21.3	6.7	130	101.00	18.7 NDR (22.9)	21.0	22.946	35.3 E(3)	27.31	23.53	86.2%	35
1,2,3,6,7,8-HxCDD	57653-85-7	51.52	54.1	59.0	50.3	52	52.30	56.4	68	62.0	65.442	62.5	59.42	8.17	13.8%
1,2,3,7,8,9-HxCDD	19408-74-3	39.04	31.4	47.9	18.3	42	31.60	40.4	38.0*	26.0	43.54	32.9	36.40	8.17	22.4%
1,2,3,4,6,7,8-HpCDD	35822-46-9	429.76	408	527	404.1	370	436.00	511	506	510	494.35	519	502.95	60.47	12.0%
1,2,3,4,5,6,7,8-OCDD	3268-87-9	2481.60	2960	3230	2400.5	2400	2700.00	3150	3230	3100	2903.21	3340	3070.44	403.11	13.1%
2,3,7,8-TCDF	51207-31-9	33.68	42.0	77.0	40.3	36	42.40	93.2	34.9*	41.0	54.43	40.4	48.92	17.09	34.9%
1,2,3,7,8-PeCDF	57117-41-6	32.32	40.7	40.4	26.7	70	60.90	34.4	40.1	32.0	37.648	43.9	39.99	17.08	42.7%
2,3,4,7,8-PeCDF	57117-31-4	44.16	73.0	49.3	56.8	40	49.20	42.7	48.9*	47.0	76.618	67.2	48.10	13.26	27.6%
1,2,3,4,7,8-HxCDF	70648-26-9	420.24	420	478.00	375.2	330	385.00	582	440*	440	428.92	433	469.71	149.54	31.8%
1,2,3,6,7,8-HxCDF	57117-44-9	73.84	85.7	92.7	76.6	79	85.10	89.8	123	92.0	99.048	ND(1)	105.27	61.94	58.8%
1,2,3,7,8,9-HxCDF	72918-21-9	40.08	33.7	51.1	30.4	12	28.20	4	DPE (71.7)	6.40	8.822	34.3	24.62	25.04	101.7%
2,3,4,6,7,8-HxCDF	60851-34-5	4.24	34.9	-0.4	34.2	25	25.10	37.8	71.7	33.0	63.544	45.1	39.78	15.37	38.6%
1,2,3,4,6,7,8-HpCDF	67562-39-4	1627.28	1950	1940	1780.4	1500	1760.00	830	2080	1800	2023.298	1650 P(2)	1858.34	632.12	34.0%
1,2,3,4,7,8,9-HpCDF	55673-89-7	56.08	100	110	75.3	100	89.40	42.5	109	95.0	101.406	106	95.35	24.85	26.1%
1,2,3,4,5,6,7,8-OCDF	39001-02-0	3263.52	3770	4060	3057.8	2600	3490.00	3830	4500	4300	3417.292	3820	3980.34	792.92	19.9%
Total TCDD	41903-57-5	255.36	244	231	261.0	200	437.00	337	278	260	354.574	298	251.52	71.22	28.3%
Total PeCDD	36088-22-9	47.36	234	179	212.0	170	586.00	318	129	210	221.108	263	206.90	99.19	47.9%
Total HxCDD	34465-46-8	623.52	485	585	537.2	560	597.00	560	493	540	791.748	461	549.28	124.30	22.6%
Total HpCDD	37871-00-4	842.64	790	999	844.6	700	820.00	930	983	980	981.792	1060	923.57	160.44	17.4%
Total TCDF	55722-27-5	500.72	618	449	488.0	800	1040.00	608	592	550	652.268	539	611.54	327.11	53.5%
Total PeCDF	30402-15-4	613.04	753	526	590.6	730	1240.00	506	587	630	841.212	479	642.77	272.84	42.4%
Total HxCDF	55684-94-1	1123.76	1190	1206.3	1200	1190.00	1440	1320	1400	1817.918	1120	1227.31	332.20	27.1%	33
Total HpCDF	38998-75-3	2145.52	2480	2480	2742.0	1900	2250.00	1130	2540	2700	2400.924	510	2316.17	726.15	31.4%

TABLE 4 - SAMPLE 5 (NWRI - DX-3) in pg/g, continued

PARAMETER	CAS NO.	99225	99226	99228	99229	99230	99231	99232	99233	99234	99235	99236	MEAN	SD	CV	n
PCB 77	325598-13-3	2731	2380	1200	2000	3340.00	4830	2370	2500			1870 S(1)	2701.40	899.28	33.3%	27
PCB 81	70362-50-4	< 10	276	100	61	169.00	75.5	58.4	62.0			70.1	158.90	131.58	82.8%	23
PCB 105	325598-14-4	6504	5740	1900	5500	6770.00	6230	5500	5300			6560.0	6047.97	1480.71	24.5%	27
PCB 114	74472-37-0	270	264	1100	120	576.00	204	275	250			316	367.78	233.58	63.5%	26
PCB 118	31508-00-6	14582	14300	4800	14000	14400.00	14400	12800	12200			12800 S(1)	13754.94	4197.07	30.5%	27
PCB 123	65510-44-3	1914	489	190	66	1990.00	681	404	620			465	711.76	568.68	79.9%	24
PCB 126	57465-28-8	156	122	30	94	79.10	145	95.3	88.0			109	107.67	40.57	37.7%	26
PCB 156	38280-08-4	1182	1030	450	890	1170.00	1420	1030	960			1330	1107.20	286.60	25.9%	28
PCB 157	69782-90-7	308	281	90	240	358.00	401	324	280			389	326.45	104.73	32.1%	27
PCB 167	52663-72-6	674	588	250	480	605.00	1330	538	600			730	921.00	865.53	94.0%	27
PCB 169	32774-16-6	637	12.8	-6	6	8.28	18.7	12.2	12			22.3	55.91	124.95	223.5%	26
PCB 189	39635-31-9	239	229	130	220	177.00	219	172	170			224	279.57	378.82	135.5%	27
Surrogate Recovery																
PCB 77 C13	105600-23-2	87	91.3	120	78	88.70	76.37	105	40			94.4	86.36	24.55	28.4%	27
PCB 81 C13	208461-24-9	89	NA		72	88.90	80.55	102	37			85.9	85.39	25.70	30.1%	22
PCB 105 C13	208263-62-1	83	82.7		-	65.96		116	82			107.0	84.59	26.57	31.4%	23
PCB 114 C13	208263-63-2	84	NA		-	88.30	48.04	100	82			NA(3)	83.54	28.57	34.2%	21
PCB 118 C13	104130-40-7	84	85.4		-	86.60	52.09	110	85			108	86.11	27.24	31.6%	24
PCB 123 C13	208263-64-3	82	NA		63	-	54.90	90	83			NA(3)	80.48	26.56	33.0%	20
PCB 126 C13	208263-65-4	91	69.9	103	79	91.70	86.02	119	45			90.5	85.65	31.18	36.4%	27
PCB 156 C13	208263-68-7	88	87.6		-	101.00	65.44	112	87			66.8	80.62	27.98	34.7%	22
PCB 157 C13	235416-30-5	82	81.3		-	110.00	74.15	112	86			NA(3)	81.62	28.62	35.1%	20
PCB 167 C13	208263-69-8	86	NA		73	-	61.15	112	88			NA(3)	80.33	29.02	36.1%	20
PCB 169 C13	208263-70-1	87	91.5	122	82	-	63.46	117	49			93.7	81.73	31.95	39.1%	25
PCB 189 C13	208263-73-4	85	78.4		65	102.00	77.92	120	86			26.2	80.56	28.84	35.8%	23
PCB 180 C13						91.2							92.00	0.80	0.9%	2

TABLE 5 - SAMPLE 6 (LSBRM9801) in pg/g

PARAMETER	CAS NO.	99201	99203	99204	99205	99206	99207	99208	99209a	99209b	99211	99212	99213	MEAN	SD	CV	n
2,3,7,8-TCDD	1746-01-6	15	15.4	13.50	19.3	11.2	14.2	20.4	18.2	16.8	16.78	19.7	17.28	17.43	2.94	16.9%	35
1,2,3,7,8-PeCDD	40321-16-4	9.2	8.3	6.57	7.37	4.4	6.57	9.2	6.9	7.4	6.98	9.4	6.74	7.89	1.38	17.4%	34
1,2,3,4,7,8-HxCDD	39227-28-6	9.2	3.5	8.34	7.03	6.4	6.81	8.4	7.16	8.59	8.03	10.2	6.85	8.38	1.63	19.5%	34
1,2,3,6,7,8-HxCDD	57653-85-7	22	13.2	19.30	20.1	12.9	17.23	24.1	21.4	19.5	21.56	25.1	18.87	20.30	3.18	15.7%	35
1,2,3,7,8,9-HxCDD	19408-74-3	15	8.6	15.70	19.3	5.2	11.50	16.5	26.1	21.4	14.51	19.5	18.50	16.46	5.27	32.0%	35
1,2,3,4,6,7,8-HpCDD	35822-46-9	310	376.5	253.00	311	279.0	273.95	359.5	266	226	306.04	339	282.65	292.21	36.61	12.5%	35
1,2,3,4,5,6,7,8-OCDD	3268-87-9	2000	2187.5	1960.00	1817	2189.9	1985.00	2288.4	1650	1571	1763.67	2236	1842.02	1891.20	218.46	11.6%	35
2,3,7,8-TCDF	51207-31-9	56	57.4	67.20	66.3	28.9	46.88	68.1	56.9	55.2	48.86	55.1	60.56	55.56	10.88	19.6%	35
1,2,3,7,8-PeCDF	57117-41-6	14	3.4	12.00	13.4	12.9	8.81	14.1	12.5	11.9	10.69	14.5	12.45	12.67	3.68	29.0%	35
2,3,4,7,8-PeCDF	57117-31-4	20	32.9	18.10	21.3	16.4	12.25	28.8	19.8	15.4	15.14	20.1	19.86	18.93	5.41	28.6%	35
1,2,3,4,7,8-HxCDF	70648-26-9	53	84.6	70.10	76.2	137.1	48.87	72.5	85.5	72.8	60.23	73.6	67.26	70.56	18.98	26.9%	35
1,2,3,6,7,8-HxCDF	57117-44-9	14	26.4	18.30	19.9	32.2	15.25	23.9	21.9	17.4	19.85	23.6	16.40	21.27	4.99	23.4%	34
1,2,3,7,8,9-HxCDF	72918-21-9	4.8	9.0	1.58	1.33	6.4	1.47	19.2	1.9	ND(1.50)	2.68	1.5	ND	5.63	6.08	107.9%	29
2,3,4,6,7,8-HxCDF	60851-34-5	2.9	21.9	10.60	20.0	21	15.89	6.3	18	14.4	15.42	17.9	13.41	14.82	5.65	38.1%	35
1,2,3,4,5,6,7,8-HpCDD	67562-39-4	300	351.3	228.00	306	641.9	263.19	376.2	317	274	280.21	339	261.53	309.79	68.64	22.2%	35
1,2,3,4,7,8,9-HpCDD	55673-89-7	17	20.7	11.10	17.0	<5	11.95	18.9	14.2	13.2	13.49	17.7	13.93	14.53	3.15	21.6%	33
1,2,3,4,5,6,7,8-OCDF	39001-02-0	420	511.9	432.00	458	883.3	484.00	698.3	520	347	509.76	648	481.22	523.50	98.23	18.8%	34
Total TCDD	41903-57-5	28	16.9	40.20	67.6	39.6	34.2	58.2	24	58.3	61.52	81.7	52.55	52.69	17.20	32.6%	33
Total PeCDD	36088-22-9	70	24.9	88.67	80.2	60	79.60	78.9	27.3	54.9	72.71	106	58.30	68.76	25.27	36.8%	33
Total HxCDD	34465-46-8	230	226.0	223.34	230	215.7	206.50	271.1	227	239	225.88	286	215.80	237.42	50.52	21.3%	33
Total HpCDD	37871-00-4	420	868.1	556.00	666	385.6	635.00	772.9	553	479	626.74	711	632.14	602.51	107.91	17.9%	33
Total TCDF	55722-27-5	360	116.3	322.20	372	354.4	306.00	429.2	155	19.2	382.36	466	364.13	342.36	128.44	37.5%	33
Total PeCDF	30402-15-4	220	158.0	221.10	256	440.7	194.00	247.5	118	198	165.22	279	195.78	214.83	65.97	30.7%	33
Total HxCDF	55684-94-1	160	402.0	249.58	304	322.1	230.50	304.5	215	233	247.05	341	242.23	269.69	60.57	22.5%	33
Total HpCDF	38998-75-3	110	695.7	289.80	504	180.0	375.50	503.8	425	373	410.17	457	378.61	400.52	109.65	27.4%	33

TABLE 5 - SAMPLE 6 (LSBRM9801) in pg/g, continued

PARAMETER	CAS NO.	99201	99203	99204	99205	99206	99207	99208	99209a	99209b	99211	99212	99213	MEAN	SD	CV	n
PCB 77	32598-13-3	1700	1884	1890.00		1995.80		1430	1860	1660.29	1780	2138.91	1852.32	650.22	35.1%	27	
PCB 81	70362-50-4	110	ND	138.00		49.00	ND(100)	177	52.92	50.5	133.89	85.75	46.47	54.2%	22		
PCB 105	32598-14-4	4000	8134	6950.00		4702.70		3980	3910	3695.34	4080	4197.15	4153.08	1164.09	28.0%	27	
PCB 114	74472-37-0	280	598	372.00		205.85		371	ND(500)	186.39	163	149.96	242.51	124.19	51.2%	25	
PCB 118	31508-00-6	6900	17675	11800.00		10237.10		9280	8640	7952.84	7890	8372.25	8496.82	2542.53	29.9%	27	
PCB 123	65510-44-3	300	ND	243.00		323.60	ND(30)	230	161.11	1050	354.40	317.45	305.47	96.2%	24		
PCB 126	57465-28-8	93	53	135.00		89.07	ND(10)	103	88.54	70.4	150.74	87.59	27.42	31.3%	26		
PCB 156	38380-08-4	820	1137	1010.00		801.85		863	805	550.07	712	566.01	715.75	173.49	24.2%	27	
PCB 157	69782-90-7	200	294	141.00		196.30		177	282	304.11	195	164.74	188.32	56.06	29.8%	26	
PCB 167	52663-72-6	360	557	651.00		384.25		1880	933	352.24	308	1639.62	524.92	424.07	80.8%	26	
PCB 169	32774-16-6	13	5	<30		4.74		29	ND(0.050)	8.20	8.6	<20 (11.67)	22.84	66.73	292.1%	23	
PCB 189	39635-31-9	74	100	86.50		84.44		191	161 not measured	88.2	102.51	89.64	30.55	34.1%	24		
Surrogate Recovery																	
PCB 77 C13	105600-23-2	12	56	20.00		38		44.7	56.5	93.30	89	108.60	76.38	35.70	46.7%	27	
PCB 81 C13	208461-24-9	93	56	31.00		35		48.8	42.4	87.60	85	NA	77.68	31.30	40.3%	22	
PCB 105 C13	208263-62-1	103	56	20.00		30		52.2	55.2	59.64		80.50	82.61	30.57	37.0%	23	
PCB 114 C13	208263-63-2	101	55	22.00		29		43.3	54.2	88.05		79.60	81.42	30.41	37.4%	21	
PCB 118 C13	104130-40-7	134	60	21.00		32		49.2	55.4	87.68		79.30	83.22	29.17	35.1%	24	
PCB 123 C13	208263-64-3	103	54	24.00		29		52.1	57.7	86.86		NA	79.48	29.65	37.3%	20	
PCB 126 C13	208263-65-4	28	55	18.00		25		36.2	54.7	93.70		87.90	77.38	36.45	47.1%	27	
PCB 156 C13	208263-68-7	108	61	17.00		19		39.2	46.1	63.48		104.40	81.03	33.64	41.5%	22	
PCB 157 C13	235416-30-5	107	61	18.00		14		29.5	46.1	85.65		NA	82.08	35.44	43.2%	20	
PCB 167 C13	208263-69-8	125	62	21.00		14		36.2	44.3	86.60		95.80	81.14	35.87	44.2%	20	
PCB 169 C13	208263-70-1	43	63	13.00		13		33	43.1	87.20		100.20	76.45	37.66	49.3%	25	
PCB 189 C13	208263-73-4	139	64	37.00		6		40.4	74.8	impure		82.67	34.93	42.3%	22		
PCB 180 C13												95.20	74.75	20.45	27.4%	2	
PCB 170 C14														97.80			

TABLE 5 - SAMPLE 6 (LSBRM9801) in pg/g, continued

PARAMETER	CAS NO.	99214	99215	99216	99217	99218	99219	99220	99221	99222	99223	99224-a	99224b	MEAN	SD	CV	n
2,3,7,8-TCDD	1746-01-6	17.3	21.3	20.7	15.5	20.6	21.39	19.6	17.2	19.6	21.6	12.6	15.5	17.43	2.94	16.9%	35
1,2,3,7,8-PeCDD	40321-76-4	8.37	8.9	7.76	7.44	9.2	7.36	(5.87)	6.69	8.00	8.15	6.8	6.7	7.89	1.38	17.4%	34
1,2,3,4,7,8-HxCDD	39227-28-6	9.86	9.4	7.67	7.3	8.1	8.75	10.5	9.84	9.41	9.76	5.9	6.6	8.38	1.63	19.5%	34
1,2,3,6,7,8-HxCDD	57653-85-7	24.2	22.9	18.7	17.7	20.8	25.91	19.1	21.7	22.9	22.5	16.1	17.7	20.30	3.18	15.7%	35
1,2,3,7,8,9-HxCDD	19408-74-3	17.2	17.9	16.7	13.9	14.5	22.20	21.1	20.5	15.7	19.6	11.2	11.8	16.46	5.27	32.0%	35
1,2,3,4,6,7,8-HpCDD	35822-46-9	292	297	354.6	253.0	271.7	351.16	312	300	327	282	253.1	287.8	292.21	36.61	12.5%	35
1,2,3,4,5,6,7,8-OCDD	3268-87-9	1900	1970	2300	1750	1993.9	2057.25	1870	1960	2003	1770	1395.7	1617.9	1891.20	218.46	11.6%	35
2,3,7,8-TCDF	51207-31-9	51.9	64.0	64.6	46.3	43.6	66.23	69.6	73.8	64.3	49.4	41.4	44.3	55.56	10.88	19.6%	35
1,2,3,7,8-PeCDF	57117-41-6	15.5	14.7	12.9	9.89	10.0	27.51	6.74	12.8	13.8	12.3	10.3	11.2	12.67	3.68	29.0%	35
2,3,4,7,8-PeCDF	57117-31-4	17.9	18.8	20.7	15.7	18.1	22.16	(14.9)	18.2	20.8	14.0	15	14.7	18.93	5.41	28.6%	35
1,2,3,4,7,8-HxCDF	70648-26-9	63.6	63.0	118	65.8	64.8	75.21	85.8	81.8	91.1	61.1	44.3	47.6	70.56	18.98	26.9%	35
1,2,3,6,7,8-HxCDF	57117-44-9	30.6	34.8	25.3	17.2	23.7	26.35	24.9	20.1	25.1	21.3	13.7	15.8	21.27	4.99	23.4%	34
1,2,3,7,8,9-HxCDF	72918-21-9	1.29	4.3	0.75	0.79	1.4	9.37	14.3	1.1	5.14	< 3	1.2	1.2	5.63	6.08	107.9%	29
2,3,4,6,7,8-HxCDF	60851-34-5	14.9	15.5	18.9	11.9	19.8	17.51	20.9	20.7	16.8	15.2	10.9	12.0	14.82	5.65	38.1%	35
1,2,3,4,6,7,8-HpCDF	67562-39-4	312	317	373	268	286.2	377.76	349	270	309	272	243.2	263.8	309.79	68.64	22.2%	35
1,2,3,4,7,8,9-HpCDF	55673-89-7	15.9	13.4	13.4	17.2	15.5	2.35	12.8	17.1	13.1	15.7	11.9	12.4	14.53	3.15	21.6%	33
1,2,3,4,5,6,7,8-OCDF	39001-02-0	522	535	648	425	576.0	n/a	626	554	608	566	443.7	459.6	523.50	98.23	18.8%	34
Total TCDD	41903-57-5	70.2	-	n/a	17.0	81	21.39	54.9	52.5	56.3	67.4	45.6	51.6	52.69	17.20	32.6%	33
Total PeCDD	36088-22-9	92.8	-	n/a	48.5	75	7.36	27.0	76.6	79.4	95.0	57.4	68.3	68.76	25.27	36.8%	33
Total HxCDD	34465-46-8	261	-	n/a	219	286	56.86	261	229	279	286	188.6	189.5	237.42	50.52	21.3%	33
Total HpCDD	37871-00-4	585	-	n/a	574	736	351.16	692	620	713	545	532.3	618.0	602.51	107.91	17.9%	33
Total TCDF	55722-27-5	376	-	n/a	87.4	519	66.23	603	385	303	392	239.1	275.9	342.36	128.44	37.5%	33
Total PeCDF	30402-15-4	299	-	n/a	110	150	49.67	225	213	244	239	149.7	202.1	214.83	65.97	30.7%	33
Total HxCDF	55684-94-1	291	-	n/a	233	176	128.44	367	272	333	333	211.3	204.8	269.69	60.57	22.5%	33
Total HpCDF	38998-75-3	490	-	n/a	381	471	380.11	515	398	446	358	352.7	382.4	400.52	109.65	27.4%	33

TABLE 5 - SAMPLE 6 (LSBRM9801) in pg/g, continued

PARAMETER	CAS NO.	99214	99215	99216	99217	99218	99219	99220	99221	99222	99223	99224a	99224b	MEAN	SD	CV	n
PCB 81	70362-50-4	24.8	154	<50	88.4	n/a	n/a to Lab 99220	45.8	81.0	120.9	165.3	85.75	46.47	54.2%	22		
PCB 105	32598-14-4	4100	3910	3630	5287.3	n/a	n/a to Lab 99220	3660	3914	3480	3508.3	4237.3	4153.08	1164.09	28.0%	27	
PCB 114	74472-37-0	219	173	183	412.0	n/a	n/a to Lab 99220	171	140	124.7	178.8	242.51	124.19	51.2%	25		
PCB 118	31508-00-6	8870	8030	9370	12842.5	n/a	n/a to Lab 99220	7100	8559	6970	4964.2	7112.3	8496.82	2542.53	29.9%	27	
PCB 123	65510-44-3	216	311	1070	310.8	n/a	n/a to Lab 99220	160	260	81.7	82.3	317.45	305.47	96.2%	24		
PCB 126	57465-28-8	92.5	128	59.4	95.2	82.68	n/a to Lab 99220	88.5	56.3	86.1	108.8	87.59	27.42	31.3%	26		
PCB 156	38380-08-4	713	734	677	1029.6	n/a	n/a to Lab 99220	695	735	540	602.1	815.6	715.75	173.49	24.2%	27	
PCB 157	69782-90-7	192	195	211	280.4	n/a	n/a to Lab 99220	179	110	151.6	209.1	188.32	56.06	29.8%	26		
PCB 167	52663-72-6	353	319	302	478.6	n/a	n/a to Lab 99220	312	1270	270.9	324.3	524.92	424.07	80.8%	26		
PCB 169	32774-16-6	7.89	7.18	<4	10.1	6.82	n/a to Lab 99220	9.77	7.31	<20	6.5	7.5	22.84	66.73	292.1%	23	
PCB 189	39635-31-9	90.3	85.9	<50	116.9	n/a	n/a to Lab 99220	88.3	45.0	56.6	77.9	89.64	30.55	34.1%	24		
Surrogate Recovery																	
PCB 77 C13	105600-23-2	99	33	58.4	105.6	33	n/a to Lab 99220	85	73	143.39	159.7	76.38	35.70	46.7%	27		
PCB 81 C13	208461-24-9	96	47	103.6	68.7	n/a	n/a to Lab 99220	xx	87	141.18	152.0	77.68	31.30	40.3%	22		
PCB 105 C13	208263-62-1	87	90	67.9	93.7	n/a	n/a to Lab 99220	103	86	95	142.96	148.8	82.61	30.57	37.0%	23	
PCB 114 C13	208263-63-2	88	88	103.6	79.6	n/a	n/a to Lab 99220	105	90	141.52	142.1	81.42	30.41	37.4%	21		
PCB 118 C13	104130-40-7	88	97	103.6	72.4	n/a	n/a to Lab 99220	99	66	65	139.44	117.4	83.22	29.17	35.1%	24	
PCB 123 C13	208263-64-3	88	91	103.6	82.2	n/a	n/a to Lab 99220	113	xx	66	137.65	130.8	79.48	29.65	37.3%	20	
PCB 126 C13	208263-65-4	95	71	80.5	104.7	20	n/a to Lab 99220	105	101	65	157.84	165.3	77.38	36.45	47.1%	27	
PCB 156 C13	208263-68-7	95	92	79.8	84.3	n/a	n/a to Lab 99220	65	148.31	141.8	81.03	33.64	41.5%	22			
PCB 157 C13	235416-30-5	90	89	79.8	87.3	n/a	n/a to Lab 99220	96	141.36	144.4	82.08	35.44	43.2%	20			
PCB 167 C13	208263-69-8	89	95	103.5	80.2	n/a	n/a to Lab 99220	74	148.85	146.3	81.14	35.87	44.2%	20			
PCB 169 C13	208263-70-1	90	67	120	57.5	26	n/a to Lab 99220	104	96	140.88	163.0	76.45	37.66	49.3%	25		
PCB 189 C13	208263-73-4	87	66	105.3	83.5	n/a	n/a to Lab 99220	94	109	126.56	138.0	82.67	34.93	42.3%	22		
PCB 180 C13															74.75	20.45	27.4%

TABLE 5 - SAMPLE 6 (LSBRM9801) in pg/g, continued

PARAMETER	CAS NO.	99225	99226	99228	99229	99230	99231	99232	99233	99234	99235	99236	MEAN	SD	CV	n
2,3,7,8-TCDD	1746-01-6	18.36	16.0	16.0	13.6	13	17.70	18.1	18.6	15.0	24.69	18.3	17.43	2.94	16.9%	35
1,2,3,7,8-PeCDD	40321-76-4	8.54	8.42	8.0	not found	6.8	9.08	10.3	8.35	7.00	10.672	11.0	7.89	1.38	17.4%	34
1,2,3,4,7,8-HxCDD	39227-28-6	6.79	8.00	8.7	not found	10	12.60	8.83	9.71	8.80	8.418	9.6	8.38	1.63	19.5%	34
1,2,3,6,7,8-HxCDD	57653-85-7	20.36	21.1	22.2	13.8	18	19.80	22	21.8	19.0	25.962	21.0	20.30	3.18	15.7%	35
1,2,3,7,8,9-HxCDD	19408-74-3	23.07	9.92	24.1	2.5	14	11.90	23.3	21.8*	15.0	21.424	15.1	16.46	5.27	32.0%	35
1,2,3,4,6,7,8-HpCDD	35822-16-9	274.09	257	303	246.5	220	271.00	313	292	260	329.952	297	292.21	36.61	12.5%	35
1,2,3,4,5,6,7,8-OCDD	3268-87-9	1744.99	1940	1860	1574.9	1500	1640.00	2090	1940	1800	2043.996	1980	1891.20	218.46	11.6%	35
2,3,7,8-TCDF	51207-31-9	45.99	54.1	65.3	41.1	43	46.50	79.1	48.4*	55.0	67.288	52.1	55.56	10.88	19.6%	35
1,2,3,7,8-PeCDF	57117-41-6	11.9	15.5	14.3	7.5	15	14.80	12.9	12.8	10.0	14.468	15.8	12.67	3.68	29.0%	35
2,3,4,7,8-PeCDF	57117-31-4	18.6	26.8	22.8	16.4	15	17.70	19.5	20.2*	18.0	26.224	25.4	18.93	5.41	28.6%	35
1,2,3,4,7,8-HxCDF	70648-26-9	77.05	47.1	87.0	45.9	54	56.40	78.9	62.6*	73.0	62.728	60.5	70.56	18.98	26.9%	35
1,2,3,6,7,8-HxCDF	57117-44-9	18.36	22.6	21.8	14.4	19	18.00	18.4	22.9	18.0	21.63	ND(1)	21.27	4.99	23.4%	34
1,2,3,7,8,9-HxCDF	72918-21-9	18.12	6.11	22.2	not found	2.5	<4	1.58	DPE (13.7)	<2	1.096	7.2	5.63	6.08	107.9%	29
2,3,4,6,7,8-HxCDF	60851-34-5	2	15.9	-0.7	9.2	13	13.80	14.5	23.8	14.0	22.0762	18.5	14.82	5.65	38.1%	35
1,2,3,4,6,7,8-HpCDF	67562-39-4	300.28	332	312	266.0	220	305.00	302	316	280	301.164	329 P(2)	309.79	68.64	22.2%	35
1,2,3,4,7,8,9-HpCDF	55673-89-7	11.58	18.3	16.0	not found	16	12.70	14.6	16.6	13.0	16.296	14.7	14.53	3.15	21.6%	33
1,2,3,4,5,6,7,8-OCDF	39001-02-0	574.37	539	524	459.9	400	474.00	553	478	480	514.418	446	523.50	98.23	18.8%	34
Total TCDD	41903-57-5	57.25	52.7	54.0	48.8	46	64.00	72.1	59.6	57.0	76.47	70.3	52.69	17.20	32.6%	33
Total PeCDD	36088-22-9	21.4	84.4	94.3	88.8	77	60.00	115	53.1	64.0	79.226	103	68.76	25.27	36.8%	33
Total HxCDD	34465-46-8	260.12	214	259	213.8	200	239.00	254	251	220	403.978	268	237.42	50.52	21.3%	33
Total HpCDD	37871-00-4	610.3	537	641	554.6	450	579.00	659	632	560	709.872	678	602.51	107.91	17.9%	33
Total TCDF	55722-27-5	373.33	410	356	337.4	490	392.00	436	413	340	477.33	379	342.36	128.44	37.5%	33
Total PeCDF	30402-15-4	238.24	278	236	207.2	210	292.00	209	198	200	256.986	189	214.83	65.97	30.7%	33
Total HxCDF	55684-94-1	277.45	267	305	256.6	280	260.00	274	261	270	396.562	252	269.69	60.57	22.5%	33
Total HpCDF	38998-75-3	429.46	466	441	453.2	310	409.00	459	423	420	414.84	115	400.52	109.65	27.4%	33

TABLE 5 - SAMPLE 6 (LSBRM9801) in pg/g, continued

PARAMETER	CAS NO.	99225	99226	99228	99229	99230	99231	99232	99233	99234	99235	99236	MEAN	SD	CV	n	
PCB 77	32598-13-3	1809	1510	630		1300	2190.00	3530	1690	1500		1780	1852.32	650.22	35.1%	27	
PCB 81	70362-50-4	< 10	111	50		34	119.00	50.8	44.7	40.0		45.6	85.75	46.47	54.2%	22	
PCB 105	32598-14-4	4367	3720	1400		3400	4350.00	4220	3790	3200		4310	4153.08	1164.09	28.0%	27	
PCB 114	74472-37-0	182	274	550		120	291.00	178	186	150		204	242.51	124.19	51.2%	25	
PCB 118	31508-00-6	8659	8210	3100		7300	8290.00	8270	7600	7000		8420	8496.82	2542.53	29.9%	27	
PCB 123	65510-44-3	1162	195	100		18	154.00	149	195	280		212	317.45	305.47	96.2%	24	
PCB 126	57465-28-8	109	52.3	30		68	67.50	126	79.2	73.0		92.1	87.59	27.42	31.3%	26	
PCB 156	38380-08-4	747	605	250		560	721.00	651	632	560		793	715.75	173.49	24.2%	27	
PCB 157	69782-90-7	195	153	50		130	181.00	203	168	130		204	188.32	56.06	29.8%	26	
PCB 167	52663-72-6	390	278	120		270	327.00	561	318	300		389	524.92	424.07	80.8%	26	
PCB 169	32774-16-6	335	6.20	-6		2	5.86	10.4	6.60	6.30		9.73	22.84	66.73	292.1%	23	
PCB 189	39635-31-9	92	77.5	50		73	82.60	87.8	72.8	77.0		90.0	89.64	30.55	34.1%	24	
Surrogate Recovery																	
PCB 77 C13	105600-23-2	91	128	79.5		63	93.60	69.23	106	44		79.6	76.38	35.70	46.7%	27	
PCB 81 C13	208461-24-9	91	NA			58	92.70	76.03	104	40		73.3	77.68	31.30	40.3%	22	
PCB 105 C13	208263-62-1	85	113			-	-	52.36	106	82		90.2	82.61	30.57	37.0%	23	
PCB 114 C13	208263-63-2	86	NA			-	92.50	48.35	90	83		NA(3)	81.42	30.41	37.4%	21	
PCB 118 C13	104130-40-7	87	113			-	93.40	49.07	107	86		95.8	83.22	29.17	35.1%	24	
PCB 123 C13	208263-64-3	85	NA			57	-	53.45	90	85		NA(3)	79.48	29.65	37.3%	20	
PCB 126 C13	208263-65-4	97	87	58.0		59	99.40	75.74	120	55		74.2	77.38	36.45	47.1%	27	
PCB 156 C13	208263-68-7	91	107			-	102.00	71.80	114	80		52.6	81.03	33.64	41.5%	22	
PCB 157 C13	235416-30-5	86	104			-	114.00	53.42	116	79		NA(3)	82.08	35.44	43.2%	20	
PCB 167 C13	208263-69-8	92	NA			54	-	59.34	107	89		NA(3)	81.14	35.87	44.2%	20	
PCB 169 C13	208263-70-1	91	118	77.6		66	-	55.33	117	57		69.0	76.45	37.66	49.3%	25	
PCB 189 C13	208263-73-4	90	108			53	113.00	63.07	109	87		25.2	82.67	34.93	42.3%	22	
PCB 180 C13						54.3								74.75	20.45	27.4%	2

TABLE 6 - SAMPLE 7 (NIST SRM11939) in pg/g

PARAMETER	CAS NO.	99201	99203	99204	99205	99206	99207	99208	99209a	MEAN	SD	CV	n
2,3,7,8-TCDD	1746-01-6	2	0.7	1.18	1.71	<1	1.10	0.29	1.17	1.64	1.17	71.0%	29
1,2,3,7,8-PeCDD	40321-76-4	4.6	4.2	4.99	4.72	4.4	5.54	6.74	4.41	6.00	2.81	46.8%	34
1,2,3,4,7,8-HxCDD	39227-28-6	12	3.3	12.90	9.56	7	19.84	12.58	9.02	12.46	3.41	27.4%	35
1,2,3,6,7,8-HxCDD	57653-85-7	47	31.0	37.10	44.4	53.1	55.00	57.81	36	48.64	7.26	14.9%	35
1,2,3,7,8,9-HxCDD	19408-74-3	27	17.8	29.10	28.9	17.2	21.52	27.69	24.8	25.61	5.96	23.3%	35
1,2,3,4,6,7,8-HpCDD	35892-46-9	1200	1412.8	1050.00	1240	1185.8	2072.74	1589.00	1010	1274.65	222.48	17.5%	35
1,2,3,4,5,6,7,8-OCDD	32668-87-9	15000	15611.1	11000.00	12772	13996.5	34175.00	17547.28	13900	14673.49	4065.27	27.7%	35
2,3,7,8-TCDF	51207-31-9	26	34.8	62.50	78.2	<1	41.33	50.40	67	46.69	20.48	43.9%	34
1,2,3,7,8-PeCDF	57117-41-6	6.4	1.9	5.24	8.40	<2	7.31	10.72	4.72	8.63	3.66	42.4%	34
2,3,4,7,8-PeCDF	57117-31-4	46	56.4	21.90	29.2	<2	23.45	37.92	19.8	32.60	13.10	40.2%	34
1,2,3,4,7,8-HxCDF	70648-26-9	20	34.6	27.70	33.7	35.8	27.80	33.34	28.2	36.35	22.45	61.8%	35
1,2,3,6,7,8-HxCDF	57117-44-9	6.2	14.4	10.90	12.4	10.9	12.12	13.75	9.71	12.70	2.87	22.6%	34
1,2,3,7,8,9-HxCDF	72918-21-9	4.8	9.1	0.76	1.11	8.3	2.31	18.72	2.1	5.18	5.06	97.6%	29
2,3,4,6,7,8-HxCDF	60851-34-5	8.5	14.5	7.78	17.4	33.4	14.24	7.57	12.2	11.96	6.46	54.0%	33
1,2,3,4,6,7,8-HpCDF	67562-39-4	280	292.1	220.00	283	566.8	298.79	349.00	229	297.93	68.01	22.8%	35
1,2,3,4,7,8,9-HpCDF	55673-89-7	16	24.3	16.20	21.9	22.6	19.81	23.10	16	18.81	4.99	26.5%	35
1,2,3,4,5,6,7,8-OCDF	39001-02-0	720	721.7	397.00	717	955	1004.50	927.08	648	795.52	170.26	21.4%	34
Total TCDD	41903-57-5	42	2.2	14.58	25.7	23.4	37.80	14.72	19.3	23.11	11.37	49.2%	33
Total PeCDD	36088-22-9	120	18.2	40.19	39.6	58.7	153.50	79.06	44.4	64.00	34.08	53.3%	33
Total HxCDD	34465-46-8	580	360.8	412.10	425	455.8	1158.00	615.13	450	492.18	154.61	31.4%	33
Total HpCDD	37871-00-4	1900	3441.2	2340.00	2730	1580.8	5323.00	3577.70	2540	2744.33	682.31	24.9%	33
Total TCDF	55722-27-5	1100	89.4	553.50	953	1474.9	1319.50	1491.52	879	956.23	390.93	40.9%	33
Total PeCDF	30402-15-4	300	208.2	260.14	369	526.9	349.50	439.66	215	331.99	105.06	31.6%	33
Total HxCDF	55684-94-1	220	319.4	269.14	323	542.1	321.00	366.54	292	322.40	92.00	28.5%	33
Total HpCDF	38998-75-3	470	1308.8	498.20	958	834.0	1060.50	1062.59	769	828.06	206.36	24.9%	33

TABLE 6 - SAMPLE 7 (NIST SRM 1939) in pg/g, continued

PARAMETER	CAS NO.	99201	99203	99204	99205	99206	99207	99208	99209a	MEAN	SD	CV	n
PCB 77	32598-13-3	200000	110807	186000.00		513335.40		18300	260447.63	169932.40	65.2%	25	
PCB 81	70362-50-4	8500	ND	13700.00		10648.85		1200	6836.90	4058.98	59.4%	25	
PCB 105	32598-14-4	150000	204189	302000.00		310937.25		13500	176317.70	102885.80	58.4%	27	
PCB 114	74472-37-0	120000	38122	45200.00		31600.90		ND(1000)	26187.58	21947.72	83.8%	25	
PCB 118	31508-00-6	200000	100564	549000.00		856553.75		41300	340832.29	186629.28	54.8%	26	
PCB 123	65510-44-3	29000	ND	15600.00		5226.90		ND(5000)	23464.21	23047.08	98.2%	22	
PCB 126	57465-28-8	4300	2719	7430.00		6359.85		ND(1000)	4498.83	1712.77	38.1%	26	
PCB 156	38380-08-4	52000	44022	62800.00		67099.65		3990	41666.88	16846.10	40.4%	27	
PCB 157	69782-90-7	15000	11300	8120.00		16436.95		1170	9723.66	3824.70	39.3%	26	
PCB 167	52663-72-6	11000	15614	31000.00		24352.90		4580	20854.75	19976.77	95.8%	26	
PCB 169	32774-16-6	66	ND	99.20		84.05		ND(500)	77.01	26.89	34.9%	23	
PCB 189	39635-31-9	4300	3672	3570.00		5163.65		329	3560.32	1371.69	38.5%	26	
Surrogate Recovery													
PCB 77 C13	105600-23-2	22	77	50.00		119		122	81.58	33.19	40.7%	25	
PCB 81 C13	208461-24-9	127	74	70.00		88		109	87.88	23.67	26.9%	22	
PCB 105 C13	208263-62-1	155	55	65.00		91		98.3	95.85	29.65	30.9%	23	
PCB 114 C13	208263-63-2	28	33	67.00		79		101	85.47	29.13	34.1%	21	
PCB 118 C13	104130-40-7	254	95	61.00		73		106.3	99.56	40.51	40.7%	23	
PCB 123 C13	208263-64-3	56	50	82.00		70		98.1	80.70	28.28	35.0%	20	
PCB 126 C13	208263-65-4	30	55	68.00		68		100	82.34	32.97	40.0%	27	
PCB 156 C13	208263-68-7	145	67	78.00		68		83	91.24	26.58	29.1%	22	
PCB 157 C13	235416-30-5	132	64	79.00		50		92.7	91.35	24.84	27.2%	20	
PCB 167 C13	208263-69-8	231	73	87.00		37		89.5	97.53	36.54	37.5%	21	
PCB 169 C13	208263-70-1	39	62	66.00		40		87.1	80.09	27.56	34.4%	24	
PCB 189 C13	208263-73-4	159	70	103.00		19		76.8	90.20	30.35	33.6%	23	
PCB 180 C13									91.15	1.05	1.2%	2	

TABLE 6 - SAMPLE 7 (NIST SRM 1939) in pg/g, continued

PARAMETER	CAS NO.	99209b	99211	99213	99214	99215	99216	99217	99218	MEAN	SD	CV	n
2,3,7,8-TCDD	1746-01-6	ND(1.00)	1.52	1.66	1.74	7.2	1.68	0.86	2.4	1.59	1.64	1.17	71.0% 29
1,2,3,7,8-PeCDD	40321-76-4	4.78	5.08	5.95	6.22	5.7	5.56	5.01	8.1	5.74	6.00	2.81	46.8% 34
1,2,3,4,7,8-HxCDD	39227-28-6	12.6	12.70	13.21	13.6	12.3	13.1	11.0	13.6	12.46	3.41	27.4%	35
1,2,3,6,7,8-HxCDD	57653-85-7	50.1	50.33	60.64	54.6	48.5	50.6	43.0	53.9	62.85	48.64	7.26	14.9% 35
1,2,3,7,8,9-HxCDD	19408-74-3	32.7	21.85	37.21	27.5	23.7	25.7	22.5	27.6	25.93	25.61	5.96	23.3% 35
1,2,3,4,6,7,8-HpCDD	35822-46-9	1060	1286.21	1718.81	1210	1190	1630	1070	1171.4	1500.19	1274.65	222.48	17.5% 35
1,2,3,4,5,6,7,8-OCDD	3268-87-9	13100	13245.46	19260.38 E	14100	13900	16100	12300	14066.5	14786.17	14673.49	4065.27	27.7% 35
2,3,7,8-TCDF	51207-31-9	63.9	32.15	56.45	40.7	39.8	49.1	26.0	38.1	47.69	46.69	20.48	43.9% 34
1,2,3,7,8-PeCDF	57117-41-6	5.6	6.23	12.15	11.2	9.5	9.59	6.56	5.5	23.7	8.63	3.66	42.4% 34
2,3,4,7,8-PeCDF	57117-31-4	24.1	24.22	41.40	29.4	26.5	33.8	23.1	31.1	38	32.60	13.10	40.2% 34
1,2,3,4,7,8-HxCDF	70648-26-9	29.6	32.61	44.06	32.1	28.2	49.7	92.9	29.6	40.02	36.35	22.45	61.8% 35
1,2,3,6,7,8-HxCDF	57117-44-9	11.3	14.12	17.13	15.2	18.3	16.1	12.2	13.1	18.62	12.70	2.87	22.6% 34
1,2,3,7,8,9-HxCDF	72918-21-9	ND(1.05)	5.69	ND	1.62	6.0	1.08	0.73	0.5	10.5	5.18	5.06	97.6% 29
2,3,4,6,7,8-HxCDF	60851-34-5	7.17	7.17	10.32	10.4	8.1	9.39	6.26	7.0	12.13	11.96	6.46	54.0% 33
1,2,3,4,6,7,8-HpCDF	67562-39-4	269	300.61	346.13	468	269	342	256	252.4	352.88	297.93	68.01	22.8% 35
1,2,3,4,7,8,9-HpCDF	55673-89-7	20.5	19.61	23.40	22.1	15.3	18.5	24.6	21.8	2.35	18.81	4.99	26.5% 35
1,2,3,4,5,6,7,8-OCDF	39001-02-0	621	829.98	1086.64	848	688	949	563	752.6	n/a	795.52	170.26	21.4% 34
Total TCDD	41903-57-5	21.3	22.69	25.12 JA	35.4	n/a	1.61	43	1.59	23.11	11.37	49.2%	33
Total PeCDD	36088-22-9	8.38	49.71	93.89 JA	95.1	n/a	26.6	70	5.74	64.00	34.08	53.3%	33
Total HxCDD	34465-46-8	453	467.55	569.61	509	n/a	416	507	105.08	492.18	154.61	31.4%	33
Total HpCDD	37871-00-4	2230	2966.57	3923.83	2600	n/a	2540	2808	1500.19	2744.33	682.31	24.9%	33
Total TCDF	55722-27-5	751	1301.33	1508.42	1180	n/a	65.8	1430	47.69	956.23	390.93	40.9%	33
Total PeCDF	30402-15-4	230	405.45	507.04	419	n/a	127	210	61.70	331.99	105.06	31.6%	33
Total HxCDF	55684-94-1	207	585.94	404.86	369	n/a	261	215	81.27	322.40	92.00	28.5%	33
Total HpCDF	38998-75-3	747	1061.63	1105.29	1170	n/a	718	763	3555.23	828.06	206.36	24.9%	33

TABLE 6 - SAMPLE 7 (NIST SRM 1939) in pg/g, continued

TABLE 6 - SAMPLE 7 (NIST SRM 1939) in pg/g, continued

PARAMETER	CAS NO.	99220	99221	99222	99223	99224a	99224b	99225	99226	99228	MEAN	SD	CV	n
2,3,7,8-TCDD	1746-01-6	1.55	0.95	1.34	< 4	0.9	1.2	1.27	1.60	1.6	1.64	1.17	71.0%	29
1,2,3,7,8-PeCDD	40321-76-4	20.5	4.27	5.09	6.09	3.7	4.4	8.69	6.13	5.7	6.00	2.81	46.8%	34
1,2,3,4,7,8-HxCDD	392227-28-6	13.1	19.1	13.1	12.6	9.6	10.2	10.76	18.60	12.2	12.46	3.41	27.4%	35
1,2,3,6,7,8-HxCDD	57653-85-7	45.0	46.5	48.9	59.3	37.5	42.7	50.04	46.30	48.3	48.64	7.26	14.9%	35
1,2,3,7,8,9-HxCDD	19408-74-3	30.9	29.3	23.3	36.0	16.1	19.4	29.8	16.30	32.2	25.61	5.96	23.3%	35
1,2,3,4,6,7,8-HpCDD	35822-46-9	1330	1220	1291	1250	1120.7	1268	1254.42	1120	1250	1274.65	222.48	17.5%	35
1,2,3,4,5,6,7,8-OCDD	3268-87-9	13500	14200	13260	14600	11786.5	11897.7	13661.99	14500	13180	14673.49	4065.27	27.7%	35
2,3,7,8-TCDF	51207-31-9	82.8	77.4	38.8	32.1	22.3	30.5	30.76	39.40	82.5	46.69	20.48	43.9%	34
1,2,3,7,8-PeCDF	57117-41-6	(4.17)	8.26	9.94	7.18	6.1	7	7.97	10.90	9.3	8.63	3.66	42.4%	34
2,3,4,7,8-PeCDF	57117-31-4	26.3	25.6	27.5	18.4	19	22.8	26.29	65.50	31.1	32.60	13.10	40.2%	34
1,2,3,4,7,8-HxCDF	70648-26-9	35.4	34.6	147	29.2	19	23.4	31.95	25.00	36.4	36.35	22.45	61.8%	35
1,2,3,6,7,8-HxCDF	57117-44-9	11.4	10.49	14.0	13.4	8.6	10.5	11.24	15.70	12.5	12.70	2.87	22.6%	34
1,2,3,7,8,9-HxCDF	72918-21-9	8.69	1	<LD (1.10)	< 3	0.6	1.1	14.82	8.38	16.2	5.18	5.06	97.6%	29
2,3,4,6,7,8-HxCDF	60851-34-5	17.0	17.3	8.30	8.78	5.2	6.2	< 4.0	16.20	-0.3	11.96	6.46	54.0%	33
1,2,3,4,6,7,8-HpCDF	67562-39-4	278	233	274	268	228.1	300.8	257.13	316	294	297.93	68.01	22.8%	35
1,2,3,4,7,8,9-HpCDF	55673-89-7	16.0	22.4	18.1	23.6	15.1	17.7	15.14	22.20	21.3	18.81	4.99	26.5%	35
1,2,3,4,5,6,7,8-OCDF	39001-02-0	830	791	772	1160	767.8	811.6	1002.79	859	666	795.52	170.26	21.4%	34
Total TCDD	41903-57-5	19.4	17.1	14.9	38.6	16	23.9	19.2	23.30	16.6	23.11	11.37	49.2%	33
Total PeCDD	36088-22-9	88.2	71.6	35.1	85.5	48.6	57.6	14.18	81.00	39.2	64.00	34.08	53.3%	33
Total HxCDD	34465-46-8	517	436	505	568	350.1	398	516.97	409	483	492.18	154.61	31.4%	33
Total HpCDD	37871-00-4	2960	2500	2882	2760	2439.7	2748.7	2880.08	2260	2860	2744.33	682.31	24.9%	33
Total TCDF	55722-27-5	888	794	731	967	589.5	687.3	1018.88	1080	981	956.23	390.93	40.9%	33
Total PeCDF	30402-15-4	326	340	370	358	234.9	275.6	348.21	423	334	331.99	105.06	31.6%	33
Total HxCDF	55684-94-1	372	288	359	380	224.1	254.2	301.99	332	305	322.40	92.00	28.5%	33
Total HpCDF	38998-75-3	907	762	851	713	687.2	842.3	856.57	882	893	828.06	206.36	24.9%	33

TABLE 6 - SAMPLE 7 (NIST SRM 1939) in pg/g, continued

PARAMETER	CAS NO.	99220	99221	99222	99223	99224a	99224b	99225	99226	99228	MEAN	SD	CV	n	
PCB 77	32598-13-3	n/a to Lab 99220	222055	211000	172508.5	328292.7	289064	315000	93700	260447.63	169932.40	65.2%	25		
PCB 81	70362-50-4	n/a to Lab 99220	1031	10800	9806.8	12366.7	7417	7500	3600	6836.90	4058.98	59.4%	25		
PCB 105	32598-14-4	n/a to Lab 99220	190000	195255	170000	166824	183618.9	183527	208000	58000	176317.70	102885.80	58.4%	27	
PCB 114	74472-37-0	n/a to Lab 99220	18874	18700	14062.1	15914.8	17759	31800	40400	26187.58	21947.72	83.8%	25		
PCB 118	31508-00-6	n/a to Lab 99220	367000	415079	381000	252627.3	289943.8	432422	493000	163000	340832.29	186629.28	54.8%	26	
PCB 123	65510-44-3	n/a to Lab 99220	12011	20500	27117	6627.7	75794	12500	10100	23464.21	23047.08	98.2%	22		
PCB 126	57465-28-8	n/a to Lab 99220	4135	3980	4376.2	5191.8	5483	5060	1300	4498.83	1712.77	38.1%	26		
PCB 156	38380-08-4	n/a to Lab 99220	57000	49757	39700	37687.8	41512.0	49208	37700	15100	41666.88	16846.10	40.4%	27	
PCB 157	69782-90-7	n/a to Lab 99220	10711	9670	9453.4	10269.0	11533	9100	2700	9723.66	3824.70	39.3%	26		
PCB 167	52663-72-6	n/a to Lab 99220	14883	85100	13266.5	15371.4	19701	13700	5300	20854.75	19976.77	95.8%	26		
PCB 169	32774-16-6	n/a to Lab 99220	178	70.6	45.2	57.3	57.2	15876	48.5	-60	77.01	26.89	34.9%	23	
PCB 189	39635-31-9	n/a to Lab 99220		3884	3190	2607.9	2792.7	4316	4990	2100	3560.32	1371.69	38.5%	26	
<i>Surrogate Recovery</i>															
PCB 77 C13	105600-23-2	n/a to Lab 99220		24	78	108.92	84.9	99	124	111	81.58	33.19	40.7%	25	
PCB 81 C13	208461-24-9	n/a to Lab 99220		xx	74	121.06	131.9	95	NA		87.88	23.67	26.9%	22	
PCB 105 C13	208263-62-1	n/a to Lab 99220	109	82	107	130.31	157.6	110	85		95.85	29.65	30.9%	23	
PCB 114 C13	208263-63-2	n/a to Lab 99220	115	85	123.20	137.0	122	NA		85.47	29.13	34.1%	21		
PCB 118 C13	104130-40-7	n/a to Lab 99220	128	75	108.70	119.1	107	86		99.56	40.51	40.7%	23		
PCB 123 C13	208263-64-3	n/a to Lab 99220	114	xx	68	115.84	123.6	89	NA	80.70	28.28	35.0%	20		
PCB 126 C13	208263-65-4	n/a to Lab 99220	92	46	53	131.72	165.8	133	88	91.7	82.34	32.97	40.0%	27	
PCB 156 C13	208263-68-7	n/a to Lab 99220		66		122.59	147.9	95	91		91.24	26.58	29.1%	22	
PCB 157 C13	235416-30-5	n/a to Lab 99220		103		119.07	142.7	92	85		91.35	24.84	27.2%	20	
PCB 167 C13	208263-69-8	n/a to Lab 99220		77		119.65	136.9	91	NA	119	97.53	36.54	37.5%	21	
PCB 169 C13	208263-70-1	n/a to Lab 99220		78	86	112.31	143.1	93	86		80.09	27.56	34.4%	24	
PCB 189 C13	208263-73-4	n/a to Lab 99220	109	108	102.39	129.8	98	74		90.20	30.35	33.6%	23		
PCB 180 C13										90.1	91.15	1.05	1.2%	2	

NOTE: Laboratory 99225's result for PCB169 (in italics) was excluded from the calculations for the Mean and Standard Deviation.

TABLE 6 - SAMPLE 7 (NIST SRM 1939) in pg/g, continued

PARAMETER	CAS NO.	99229	99230	99231	99232	99233	99234	99235	99236	MEAN	SD	CV	n
2,3,7,8-TCDD	1746-01-6	not found	-	1.01	1.8	NDR (1.5)	1.80	2.962	1.78 E(3)	1.64	1.17	71.0%	29
1,2,3,7,8-PeCDD	40321-76-4	not found	3.7	4.00	6.68	5.08	6.50	8.192	6.91 E(3)	6.00	2.81	46.8%	34
1,2,3,4,7,8-HxCDD	39227-28-6	4.2	11	15.10	13.6	11.2	14.0	15.43	12.5	12.46	3.41	27.4%	35
1,2,3,6,7,8-HxCDD	57653-85-7	43.9	41	44.80	55.3	48.1	47.0	59.934	45.9	48.64	7.26	14.9%	35
1,2,3,7,8,9-HxCDD	19408-74-3	16.9	21	19.90	37	20.8*	23.0	34.316	20.8	25.61	5.96	23.3%	35
1,2,3,4,6,7,8-HpCDD	35822-46-9	1070.8	820	1150.00	1340	1290	1200	1364.92	1260	1274.65	222.48	17.5%	35
1,2,3,4,5,6,7,8-OCDD	3268-87-9	12101.9	11000	12400.00	9320	15300	14000	19973.672	13900	14673.49	4065.27	27.7%	35
2,3,7,8-TCDF	51207-31-9	29.2	30	32.60	112	27.2*	32.0	54.932	37.2	46.69	20.48	43.9%	34
1,2,3,7,8-PeCDF	57117-41-6	4.8	11	11.50	11.2	8.03	8.20	10.616	12.6	8.63	3.66	42.4%	34
2,3,4,7,8-PeCDF	57117-31-4	46.8	19	27.30	31.3	26.0*	31.0	72.878	54.7	32.60	13.10	40.2%	34
1,2,3,4,7,8-HxCDF	70648-26-9	27.1	23	24.20	39.7	27.0*	35.0	31.582	31.0	36.35	22.45	61.8%	35
1,2,3,6,7,8-HxCDF	57117-44-9	6.3	10	11.20	13.5	12.9	13.0	13.964	ND(1)	12.70	2.87	22.6%	34
1,2,3,7,8,9-HxCDF	72918-21-9	not found	2.7	1.50	1.41	DPE (9.12)	<2	1.268	8.33	5.18	5.06	97.6%	29
2,3,4,6,7,8-HxCDF	60851-34-5	15.6	6.7	8.00	7.99	18.2	8.60	31.542	15.6	11.96	6.46	54.0%	33
1,2,3,4,6,7,8-HpCDF	67562-39-4	300.9	190	260.00	302	287	260	298.626	364 P(2)	297.93	68.01	22.8%	35
1,2,3,4,7,8,9-HpCDF	55673-89-7	2.8	14	16.20	22.7	20.3	19.0	21.534	20.0	18.81	4.99	26.5%	35
1,2,3,4,5,6,7,8-OCDF	39001-02-0	643.5	550	680.00	1120	945	710	719.12	631	795.52	170.26	21.4%	34
Total TCDD	41903-57-5	18.1	13	33.00	39.9	21.8	19.0	45.058	19.3	23.11	11.37	49.2%	33
Total PeCDD	36088-22-9	57.1	62	72.00	120	26.7	73.0	73.238	102	64.00	34.08	53.3%	33
Total HxCDD	34465-46-8	491.3	360	492.00	575	423	460	699.64	495	492.18	154.61	31.4%	33
Total HpCDD	37871-00-4	2481.4	1800	2440.00	2950	2790	2600	3068.574	2970	2744.33	682.31	24.9%	33
Total TCDF	55722-27-5	1051.7	850	746.00	1220	942	1000	1651.1	902	956.23	390.93	40.9%	33
Total PeCDF	30402-15-4	373.5	270	336.00	341	345	330	557.168	316	331.99	105.06	31.6%	33
Total HxCDF	55684-94-1	309.2	290	278.00	370	332	310	452.998	322	322.40	92.00	28.5%	33
Total HpCDF	38998-75-3	941.8	540	735.00	994	857	830	777.21	481	828.06	206.36	24.9%	33

TABLE 6 - SAMPLE 7 (NIST SRM 1939) in pg/g, continued

PARAMETER	CAS NO.	99229	99230	99231	99232	99233	99234	99235	99236	MEAN	SD	CV	n
PCB 77	322598-13-3	120000	421000.00	176000	204000	270000			S(1)	260447.63	169932.40	65.2%	25
PCB 81	70362-50-4	3000	3390.00	3520	5370	6600			3550 S(1)	6836.90	4058.98	59.4%	25
PCB 105	322598-14-4	24000	209000.00	172000	180000	180000			32500 S(1)	176317.70	102885.80	58.4%	27
PCB 114	74472-37-0	630	18700.00	27800	20000	20000			19900 S(1)	26187.58	21947.72	83.8%	25
PCB 118	31508-00-6	180000	440000.00	73900	403000	430000			S(1)	340832.29	186629.28	54.8%	26
PCB 123	65510-44-3	-	16200.00	14700	9690	17000			NC(2)	23464.21	23047.08	98.2%	22
PCB 126	57465-28-8	3200	3280.00	4570	3740	4200			3660 S(1)	4498.83	1712.77	38.1%	26
PCB 156	38380-08-4	20000	50100.00	36700	43000	42000			+6200	41666.88	16846.10	40.4%	27
PCB 157	69782-90-7	4400	9990.00	12900	10300	9700			12700	9723.66	3824.70	39.3%	26
PCB 167	526663-72-6	10000	14800.00	29200	16100	13000			19400	20854.75	19976.77	95.8%	26
PCB 169	32774-16-6	61	66.40	108	53.5	67.0			74.30	77.01	26.89	34.9%	23
PCB 189	39635-31-9	3100	3920.00	4370	3580	3500			4810	3560.32	1371.69	38.5%	26
Surrogate Recovery													
PCB 77 C13	105600-23-2	68	63.20	117.60	132	59			NC(2)	81.58	33.19	40.7%	25
PCB 81 C13	208461-24-9	60	67.40	66.64	100	53			69.9	87.88	23.67	26.9%	22
PCB 105 C13	208263-62-1	-	-	53.65	86	93			120	95.85	29.65	30.9%	23
PCB 114 C13	208263-63-2	-	80.20	68.71	65	88			NA(3)	85.47	29.13	34.1%	21
PCB 118 C13	104130-40-7	-	78.80	121.33	80	84			NC(2)	99.56	40.51	40.7%	23
PCB 123 C13	208263-64-3	70	-	54.31	62	82			NA(3)	80.70	28.28	35.0%	20
PCB 126 C13	208263-65-4	88	74.40	80.71	115	63			76.1	82.34	32.97	40.0%	27
PCB 156 C13	208263-68-7	-	74.00	129.84	121	106			55.6	91.24	26.58	29.1%	22
PCB 157 C13	235416-30-5	-	70.20	79.77	120	109			NA(3)	91.35	24.84	27.2%	20
PCB 167 C13	208263-69-8	72	-	94.57	104	101			NA(3)	97.53	36.54	37.5%	21
PCB 169 C13	208263-70-1	92	-	62.46	119	64			73.1	80.09	27.56	34.4%	24
PCB 189 C13	208263-73-4	68	70.80	80.16	103	112			27.3	90.20	30.35	33.6%	23
PCB 180 C13										91.15	1.05	1.2%	2

TABLE 7 - SAMPLE 8 (NIST SRM 1941a) in pg/g

PARAMETER	CAS NO.	99201	99203	99204	99205	99206	99207	99208	99209a	99209b	99211	99213	MEAN	SD	CV	n
2,3,7,8-TCDD	1746-01-6	0.45	0.8	1.03	0.911	1.5	0.60	0.96	0.7 ND(0.100)	0.86	1.1	0.75	1.15	1.22	106.5%	30
1,2,3,7,8-PeCDD	40321-76-4	4.1	5.2	3.80	3.60	10.1	3.56	0.70	4.03	3.56	5.22	6	3.77	4.68	1.50	32.0%
1,2,3,4,7,8-HxCDD	39227-28-6	6.9	5.4	8.78	6.37	18.2	6.48	7.96	7.22	8.42	7.98	10.3	6.95	8.76	2.61	29.8%
1,2,3,6,7,8-HxCDD	57653-85-7	15	13.1	19.90	14.3	42.6	13.29	17.91	15.9	15.7	17.33	21.2	15.61	17.95	5.79	32.3%
1,2,3,7,8,9-HxCDD	19408-74-3	10	9.7	24.60	17.8	24.4	9.90	16.02	25.8	22.1	13.16	17.6	20.87	18.15	5.80	31.9%
1,2,3,4,6,7,8-HpCDD	35822-46-9	330	541.8	409.00	353.0	513.8	319.25	491.54	320	83.9	386.33	482	396.52	392.13	107.36	27.4%
1,2,3,4,5,6,7,8-OCD	3268-87-9	5300	6983.3	6120.00	4508.0	9116.5	5393.5	6597.01	4400	4921	5063.3	7533	5905.93	E 5747.3	1409.8	24.5%
2,3,7,8-TCDF	51207-31-9	-32	41.5	36.20	33.9	43.2	25.61	39.70	30.1	38.2	30.99	35.5	35.14	35.56	7.35	20.7%
1,2,3,7,8-PeCDF	57117-41-6	58	71.5	64.00	54.3	40.1	39.85	66.17	45.4	41.3	49.86	74.4	65.95	59.62	14.68	24.6%
2,3,4,7,8-PeCDF	57117-31-4	16	27.8	17.00	16.2	7.0	9.63	21.79	13.9	16.4	14.93	19.5	16.41	16.37	4.32	26.4%
1,2,3,4,7,8-HxCDF	70648-26-9	65	115.0	86.20	80.5	191.4	67.88	92.44	79.7	90.2	88.92	99.5	86.47	94.62	23.60	24.9%
1,2,3,6,7,8-HxCDF	57117-44-9	12	26.0	20.00	17.1	82.5	16.06	21.00	19.2	22.3	21.59	27.4	17.47	22.91	11.88	51.8%
1,2,3,7,8,9-HxCDF	72918-21-9	9.4	22.9	9.14	9.24	41.3	5.54	10.35	7.2	8.59	10.22	10.4	10.92	10.44	6.65	63.6%
2,3,4,6,7,8-HxCDF	60851-34-5	5.5	11.3	5.64	10.0	27.5	7.38	12.64	5.2	3.21	4.82	5.6	4.27	7.92	4.73	59.7%
1,2,3,4,6,7,8-HpCDF	67562-39-4	65	112.2	79.50	77.6	145.7	67.88	92.64	74.2	83.9	89.77	115	75.31	86.66	20.52	23.7%
1,2,3,4,7,8,9-HpCDF	55673-89-7	44	65.9	46.10	49.1	38.5	35.09	51.54	42	41.7	49.79	46.4	52.34	45.05	11.07	24.6%
1,2,3,4,5,6,7,8-OCDF	39001-02-0	540	610.1	491.00	517.0	1378.5	559.00	815.92	420	518	639.86	866	711.02	655.43	180.52	27.5%
Total TCDD	41903-57-5	15	2.6	14.43	25.8	63.6	22.1	19.50	23.2	11.9	17.98	40	21.16	JA 21.78	14.66	67.3%
Total PeCDD	36088-22-9	40	32.9	69.50	56.3	83.4	63.00	56.42	34.8	63.6	39.31	88.5	81.26	JA 60.62	21.91	36.1%
Total HxCDD	34465-46-8	310	453.1	442.28	324	560.4	332.50	429.85	389	383	382.71	492	375.46	393.21	94.77	24.1%
Total HpCDD	37871-00-4	810	1933.3	1419.00	1174	1406.4	1210.5	1631.84	1010	1261	1301.4	1606	1454.74	1285.9	260.21	20.2%
Total TCDF	55722-27-5	99	60.8	90.00	126	102.6	114.50	158.21	54	101	403.67	168	139.53	132.23	60.76	45.9%
Total PeCDF	30402-15-4	110	209.1	182.00	186	425.6	131.50	181.09	101	117	259.99	240	186.29	182.29	58.10	31.9%
Total HxCDF	55684-94-1	62	263.7	215.88	216	176.0	170.50	224.88	157	206	256.15	261	207.14	212.94	47.54	22.3%
Total HpCDF	38998-75-3	65	415.3	180.00	230	164.3	175.50	255.72	192	213	250.69	260	237.15	220.56	56.59	25.7%

TABLE 7 - SAMPLE 8 (NIST SRM 1941a) in pg/g, continued

PARAMETER	CAS NO.	99201	99203	99204	99205	99206	99207	99208	99209a	99209b	99211	99212	99213	MEAN	SD	CV %	n
PCB 77	32598-13-3	520	507	782.00		1584.75		626	1000	509.23	558	628.32	678.49	320.69	47.3%	27	
PCB 81	70362-50-4	430	ND	56.80		35.35		650	109	12.91	11	51.89	77.36	151.97	196.5%	22	
PCB 105	32598-14-4	1400	1932	2910.00		2136.80		2310	2130	1398.96	1415	1396.12	1554.17	437.07	28.1%	27	
PCB 114	74472-37-0	51	133	164.00		132.25		243	245	98.24	56.2	52.69	104.73	59.37	56.7%	25	
PCB 118	31508-00-6	3300	5558	7530.00		7002.30		6960	5360	4246.48	3942	4039.93	5606.91	6101.73	108.8%	27	
PCB 123	65510-44-3	110	ND	73.90		191.10		ND(300)	339	53.38	514	150.96	167.07	154.39	92.4%	24	
PCB 126	57465-28-8	26	23	48.60		32.75		ND(100)	71	24.77	19.8	52.21	31.08	12.90	41.5%	25	
PCB 156	38380-08-4	530	518	650.00		697.25		551	411	444.45	355	346.06	439.80	102.35	23.3%	27	
PCB 157	69782-90-7	110	105	70.40		123.13		205	108	171.25	77.6	83.89	100.00	34.39	34.4%	26	
PCB 167	52663-72-6	220	229	419.00		304.10		781	624	199.16	178	781.12	296.91	189.33	63.8%	26	
PCB 169	32274-16-6	2	1	<30		4.78		ND(0.500)	ND(0.5)	5.27	1.6	<20	3.42	1.29	37.8%	20	
PCB 189	39635-31-9	61	66	55.00		83.80		ND(20.0)	ND(0.5)	56.22	68.2	67.50	59.91	12.26	20.5%	23	
Surrogate Recovery																	
PCB 77 C13	105600-23-	49	38	44.00		76		59.5	68	65.60	74	111.40	79.39	25.06	31.6%	27	
PCB 81 C13	208461-24-	44	37	65.00		69		57.2	82.7	64.17	86	NA	78.21	22.04	28.2%	22	
PCB 105 C13	208263-62-	67	39	51.00		70		57.5	51.9	41.89		81.40	76.77	23.85	31.1%	23	
PCB 114 C13	208263-63-	69	38	53.00		61		41.4	40.3	62.24		79.10	75.13	21.72	28.9%	21	
PCB 118 C13	104130-40-	93	36	49.00		65		59.1	51	61.08		77.70	78.82	21.16	26.9%	24	
PCB 123 C13	208263-64-	55	37	53.00		58		61.8	45.5	63.98		NA	70.12	20.90	29.8%	20	
PCB 126 C13	208263-65-	71	39	43.00		63		46.3	54.4	70.93		90.50	81.99	25.42	31.0%	27	
PCB 156 C13	208263-68-	68	40	41.00		60		56	62.7	63.52		106.40	77.90	22.32	28.7%	22	
PCB 157 C13	235416-30-	72	41	43.00		51		67.3	68.7	61.24		NA	76.99	22.14	28.8%	20	
PCB 167 C13	208263-69-	77	43	39.00		41		68	79.1	61.50		95.70	76.90	21.68	28.2%	20	
PCB 169 C13	208263-70-	73	38	31.00		49		98.1	47.9	75.50		105.30	80.21	24.90	31.0%	25	
PCB 189 C13	208263-73-	61	40	126.00		32		59.2	79.2	58.02		75.49	25.45	33.7%	23		
PCB 170 C14												100.10				1	
PCB 180 C13												105.60	86.50	19.10	22.1%	2	

TABLE 7 - SAMPLE 8 (NIST SRM 1941a) in pg/g, continued

PARAMETER	CAS NO.	99214	99215	99216	99217	99218	99219	99220	99221	99222	99223	99224a	99224b	MEAN	SD	CV	n
2,3,7,8-TCDD	1746-01-6	0.978	7.600	0.83	0.69	1.3	1.03	0.97	0.945	0.95	< 5	0.6	0.6	1.15	1.22	106.5%	30
1,2,3,7,8-PeCDD	40321-76-4	5.82	5.100	4.40	7.31	4.6	5.62	(4.17)	3.58	4.38	5.39	3.8	3.7	4.68	1.50	32.0%	34
1,2,3,4,7,8-HxCDD	39227-28-6	12.5	9.500	8.75	6.86	6.6	16.43	7.88	8.6	9.48	9.91	5.4	6.7	8.76	2.61	29.8%	34
1,2,3,6,7,8-HxCDD	57653-85-7	24.6	19.900	16.5	15.1	17.0	32.13	19.2	16.7	18.1	18.7	10.7	13.2	17.95	5.79	32.3%	35
1,2,3,7,8,9-HxCDD	19408-74-3	21.8	16.100	18.1	13.4	16.8	32.95	27.1	21.2	16.9	22.6	9.1	11.7	18.15	5.80	31.9%	35
1,2,3,4,6,7,8-HpCDD	35822-46-9	472	389,000	498	307	369.9	777.7	464	366	448	361	281.3	352.7	392.13	107.36	27.4%	35
1,2,3,4,5,6,7,8-OCDD	326887-9	6250	5521,000	6640	4380	6256.6	10740.91	6350	5410	6085	5190	3564.8	4298.2	5747.36	1409.87	24.5%	35
2,3,7,8-TCDF	51207-31-9	36.5	38.800	38.5	30.5	32.1	68.22	37.2	41.1	39.5	31.8	29.8	28.9	35.56	7.35	20.7%	35
1,2,3,7,8-PeCDF	57117-41-6	69.0	80.100	69.0	49.3	58.3	122.67	52.0	60.2	58.7	59.8	43.5	48.3	59.62	14.68	24.6%	35
2,3,4,7,8-PeCDF	57117-31-4	17.8	18.000	17.2	13.4	14.4	22.16	(14.2)	15	17.4	10.6	10.6	13.0	16.37	4.32	26.4%	35
1,2,3,4,7,8-HxCDF	70648-26-9	102	91.900	113	82.7	127.6	132.78	115	95.9	125	90.2	60.1	72.7	94.62	23.60	24.9%	35
1,2,3,6,7,8-HxCDF	57117-44-9	24.8	28.100	23.8	16.6	22.0	44.20	28.7	18.7	25.4	20.8	12.6	15.2	22.91	11.88	51.8%	34
1,2,3,7,8,9-HxCDF	72918-21-9	10.5	12.300	8.79	7.62	7.6	int	(11.3)	8.79	9.62	< 6	7.2	8.4	10.44	6.65	63.6%	34
2,3,4,6,7,8-HxCDF	60851-34-5	5.74	5.800	6.20	3.48	10.6	13.07	(6.47)	11.4	5.20	11.8	3.2	4.0	7.92	4.73	59.7%	35
1,2,3,4,5,6,7,8-OCDF	67562-39-4	130	91.500	98.1	81.1	87.4	140.94	89.4	71.9	88.5	76.3	62	70.1	86.66	20.52	23.7%	35
1,2,3,4,7,8,9-HpCDF	55673-89-7	58.5	42.700	51.0	40.2	44.6	1.09	44.9	54.8	51.5	45.4	36.4	40.4	45.05	11.07	24.6%	35
1,2,3,4,5,6,7,8-OCDF	39001-02-0	763	666,000	834	535.0	781.0	n/a	846	678	761	457	537.9	583.9	655.43	180.52	27.5%	34
Total TCDD	41903-57-5	49.9	-	n/a	0.69	40	1.03	9.08	18.1	23.3	60.1	14.3	22.1	21.78	14.66	67.3%	33
Total PeCDD	36088-22-9	101	-	n/a	61.6	69	5.62	35.7	57.8	65.4	91.7	49.6	50.7	60.62	21.91	36.1%	33
Total HxCDD	34465-46-8	513	-	n/a	381	544	81.51	473	357	462	443	239.9	300.1	393.21	94.77	24.1%	33
Total HpCDD	37871-00-4	1520	-	n/a	1090	1376	777.70	1650	1160	1568	1210	913.2	1152.7	1285.96	260.21	20.2%	33
Total TCDF	55722-27-5	167	-	n/a	38.8	187	68.22	196	136	135	138	103	87.9	132.23	60.76	45.9%	33
Total PeCDF	30402-15-4	255	-	n/a	125	151	144.83	158	186	195	189	134.8	134.9	182.29	58.10	31.9%	33
Total HxCDF	55684-94-1	289	-	n/a	183	196	190.05	233	227	234	299	161.8	173.0	212.94	47.54	22.3%	33
Total HpCDF	38998-75-3	305	-	n/a	199	250	142.03	234	219	266	193	162.4	187.6	220.56	56.59	25.7%	33

TABLE 7 - SAMPLE 8 (NIST SRM 1941a) in pg/g, continued

PARAMETER	CAS NO.	99214	99215	99216	99217	99218	99219	99220	99221	99222	99223	99224	99224b	MEAN	SD	CV	n
pCB 77	32598-13-3	550	591	433	772.8	1565.9	n/a to Lab 99220		625	342	601.4	833.9	678.49	320.69	47.3%	27	
pCB 81	70362-50-4	7.83	51.3	<50	19.1	n/a	n/a to Lab 99220		11.5	28.2	58.6	60.3	77.36	151.97	196.5%	22	
pCB 105	32598-14-4	1510	1380	1290	1878.3	n/a	n/a to Lab 99220	1360	1476	1240	1365.6	1381.8	1554.17	137.07	28.1%	27	
pCB 114	74472-37-0	92.1	54.6	69	127.6	n/a	n/a to Lab 99220		66.9	<50	50.9	54.9	104.73	59.37	56.7%	25	
pCB 118	31508-00-6	4700	-1090	5690	4957.0	n/a	n/a to Lab 99220	36000	4227	3460	2684.2	2778.7	5606.91	6101.73	108.8%	27	
pCB 123	65510-44-3	91.9	195	517	153.4	n/a	n/a to Lab 99220		113	169	32.9	51.8	167.07	154.39	92.4%	24	
pCB 126	57465-28-8	27	48.8	19.5	22.9	29.16	n/a to Lab 99220		30.6	12.4	39	36.5	31.08	12.90	41.5%	25	
pCB 156	38380-08-1	468	-451	-466	-465.8	n/a	n/a to Lab 99220	-448	-467	-291	-402.2	-451.8	-439.80	102.35	23.3%	27	
pCB 157	69782-90-7	102	99.1	121	132.6	n/a	n/a to Lab 99220		96.2	59.3	81.9	84.4	100.00	34.49	34.4%	26	
pCB 167	52663-72-6	218	185	218	245.0	n/a	n/a to Lab 99220		180	592	162.3	173.0	296.91	189.33	63.8%	26	
pCB 169	32774-16-6	2.82	2.38	<1	3.6	3.44	n/a to Lab 99220	ND	3.32	<20	4.5	4.7	3.42	1.29	37.8%	20	
pCB 189	39635-31-9	62	55.7	<50	76.2	n/a	n/a to Lab 99220		60.5	31.6	45.3	47.9	59.91	12.26	20.5%	23	
Surrogate Recovery																	
pCB 77 C13	105600-23-2	110	68	67.9	108.8	81	n/a to Lab 99220		71	76	44.28	133.8	79.39	25.06	31.6%	27	
pCB 81 C13	208461-24-9	112	71	94	111.2	n/a	n/a to Lab 99220		xx	86	71.16	123.2	78.21	22.04	28.2%	22	
pCB 105 C13	208263-62-1	8.1	90	66	41.3	n/a	n/a to Lab 99220	93	87	89	101.74	125.3	76.77	23.85	31.1%	23	
pCB 114 C13	208263-63-2	93	86	94	44.5	n/a	n/a to Lab 99220	96	91	100.36	99.2	75.13	21.72	28.9%	21		
pCB 118 C13	104130-40-7	94	96	94	44.8	n/a	n/a to Lab 99220	89	87	60	98.39	89.1	78.82	21.16	26.9%	24	
pCB 123 C13	208263-64-3	91	89	94	45.9	n/a	n/a to Lab 99220	105	xx	62	99.08	94.6	70.12	20.90	29.8%	20	
pCB 126 C13	208263-65-1	103	97	81.7	117.5	60	n/a to Lab 99220	97	75	52	115.53	150.5	81.99	25.42	31.0%	27	
pCB 156 C13	208263-68-7	85	92	70	53.3	n/a	n/a to Lab 99220		69	110.40	110.4	77.90	22.32	28.7%	22		
pCB 157 C13	235416-30-5	92	88	70	55.0	n/a	n/a to Lab 99220		69	105.71	118.7	76.99	22.14	28.8%	20		
pCB 167 C13	208263-69-8	93	92	101	47.7	n/a	n/a to Lab 99220		76	108.57	80.0	76.90	21.68	28.2%	20		
pCB 169 C13	208263-70-1	101	65	80.7	90.9	57	n/a to Lab 99220		68	83	108.06	139.2	80.21	24.90	31.0%	25	
pCB 189 C13	208263-73-4	87	60	111	50.6	n/a	n/a to Lab 99220		59	101	98.02	85.2	75.49	25.45	33.7%	23	
pCB 180 C13														86.50	19.10	22.1%	2

TABLE 7 - SAMPLE 8 (NIST SRM 1941a) in pg/g, continued

PARAMETER	CAS NO.	99225	99226	99228	99229	99230	99231	99232	99233	99234	99235	99236	MEAN	SD	CV	n
2,3,7,8-TCDD	1746-01-6	<0.60	1.09	1.1	not found	1.1	0.73	0.925	1.24	<1	1.196	0.85	1.15	1.22	106.5%	30
1,2,3,7,8-PeCDD	40321-76-4	4.47	4.81	{4.4}	not found	2.8	3.90	5.7	4.38	5.60	5.272	6.33	4.68	1.50	32.0%	34
1,2,3,4,7,8-HxCDD	39227-28-6	8.3	6.94	8.3	not found	8.3	9.64	9.66	9.17	9.70	8.462	9.68	8.76	2.61	29.8%	34
1,2,3,6,7,8-HxCDD	57653-85-7	18.2	16.30	17.0	10.9	11	15.00	18.7	19.9	22.0	17.6922	17.8	17.95	5.79	32.3%	35
1,2,3,7,8,9-HxCDD	19408-74-3	21.96	13.70	23.1	7.2	15	13.20	25.8	19.6*	20.0	19.858	16.3	18.15	5.80	31.9%	35
1,2,3,4,6,7,8-HpCDD	35822-46-9	388.18	327	407	333.0	270	321.00	422	389	436	303.24	414	392.13	107.36	27.4%	35
1,2,3,4,5,6,7,8-OCDD	3268-87-9	5625.47	5370	6040	4530.4	4300	4130.00	5790	5900	6860	3783.6	6300	5747.36	1409.87	24.5%	35
2,3,7,8-TCDF	51207-31-9	26.99	32.80	36.9	32.8	26	29.20	42.9	30.8*	40.0	38.95	32.4	35.56	7.35	20.7%	35
1,2,3,7,8-PeCDF	57117-41-6	57.96	68.20	61.2	53.2	51	44.40	60.1	59.6	63.0	57.772	68.5	59.62	14.68	24.6%	35
2,3,4,7,8-PeCDF	57117-31-4	13.81	22.80	18.4	13.6	12	12.90	16.3	16.3*	25.0	20.802	20.6	16.37	4.32	26.4%	35
1,2,3,4,7,8-HxCDF	70648-26-9	93.73	86.80	98.6	81.4	73	83.10	87.3	88.8*	102	78.058	86.3	94.62	23.60	24.9%	35
1,2,3,6,7,8-HxCDF	57117-44-9	20.76	22.40	20.3	14.4	18	14.00	23.4	22.2	21.0	19.15	ND(1)	22.91	11.88	51.8%	34
1,2,3,7,8,9-HxCDF	72918-21-9	10.46	16.50	10.1	3.9	6.3	4.40	11.4	11	4.60	14.204	14.8	10.44	6.65	63.6%	34
2,3,4,6,7,8-HxCDF	60851-34-5	8.94	8.68	9.6	3.2	2.8	3.00	4.56	11.5	14.0	10.444	10.5	7.92	4.73	59.7%	35
1,2,3,4,6,7,8-HpCDF	67562-39-4	79.52	91.10	93.5	62.7	66	72.00	91.2	87.1	89.0	57.958	77.0	86.66	20.52	23.7%	35
1,2,3,4,7,8,9-HpCDF	55673-89-7	39.28	53.00	55.5	22.5	39	39.30	56.3	49.8	54.0	39.32	54.7	45.05	11.07	24.6%	35
1,2,3,4,5,6,7,8-OCDF	39001-02-0	679.76	692	462.6	530	537.00	724	595	867	419.184	572	655.43	180.52	27.5%	34	
Total TCDD	41903-57-5	21.08	19.30	8.9	13.6	13	19.40	37.8	20.2	22.0	12.948	14.8	21.78	14.66	67.3%	33
Total PeCDD	36088-22-9	22.75	54.40	55.8	65.6	42	84.80	93.8	43.5	72.0	82.638	86.2	60.62	21.91	36.1%	33
Total HxCDD	34465-46-8	447.66	328	410	412.2	270	367.00	273	417	492	439.976	450	393.21	94.77	24.1%	33
Total HpCDD	37871-00-4	1380.6	1020	1370	1174.1	880	1060.00	1460	1320	1510	1136.206	1490	1285.96	260.21	20.2%	33
Total TCDF	55722-27-5	133.97	139	130	110.5	190	91.50	146	136	139	140.552	133	132.23	60.76	45.9%	33
Total PeCDF	30402-15-4	170.62	220	174	186.7	170	156.00	149	187	241	183.81	174	182.29	58.10	31.9%	33
Total HxCDF	55684-94-1	218.04	230	224	211.2	190	121.00	233	246	259	285.886	207	212.94	47.54	22.3%	33
Total HpCDF	38998-75-3	212.46	246	259	209.3	180	186.00	266	236	261	198.456	228	220.56	56.59	25.7%	33

TABLE 7 - SAMPLE 8 (NIST SRM 1941a) in pg/g, continued

PARAMETER	CAS NO.	99225	99226	99228	99229	99230	99231	99232	99233	99234	99235	99236	MEAN	SD	CV	n
PCB 77	32598-13-3	574	498	230		400	660.00	1260	551	506		610	678.49	320.69	47.3%	27
PCB 81	70362-50-4	< 10	13.3	-3		12	22.80	15.6	13.0	15.0		13.4	77.36	151.97	196.5%	22
PCB 105	32598-14-4	1562	1420	510		1100	1490.00	1670	1280	1420		1600	1554.17	437.07	28.1%	27
PCB 114	74472-37-0	75	120	230		44	98.70	139	60.9	73.0		86.2	104.73	59.37	56.7%	25
PCB 118	31508-00-6	4461	4440	1400		3900	4030.00	3720	3820	4230		4880	5606.91	6101.73	108.8%	27
PCB 123	65510-44-3	551	72.9	30		5	55.00	173	64.4	215		86.9	167.07	154.39	92.4%	24
PCB 126	57465-28-8	42	24.6	-3		22	16.70	32.8	22.8	25.0		27.1	31.08	12.90	41.5%	25
PCB 156	38380-08-4	475	310	180		370	405.00	460	375	389		497	439.80	102.35	23.3%	27
PCB 157	69782-90-7	111	65.4	30		62	93.20	119	79.6	102		107	100.00	34.39	34.4%	26
PCB 167	52663-72-6	233	336	80		150	181.00	446	168	170		247	296.91	189.33	63.8%	26
PCB 169	32774-16-6	350	3.41	-7		5	2.77	2.74	2.35	2.50		5.11	3.42	1.29	37.8%	20
PCB 189	39635-31-9	63	86.3	60		44	56.40	63.3	45.9	56.0		66.1	59.91	12.26	20.5%	23
Surrogate Recovery:																
PCB 77 C13	105600-23-2	89	119	114		64	86.50	64.69	115	62		83.0	79.39	25.06	31.6%	27
PCB 81 C13	208461-24-9	89	NA			55	85.90	69.13	111	61		75.7	78.21	22.04	28.2%	22
PCB 105 C13	208263-62-1	83	97.1			-	-	69.06	113	55		112	76.77	23.85	31.1%	23
PCB 114 C13	208263-63-2	82	NA			-	90.50	85.68	108	63		NA(3)	75.13	21.72	28.9%	21
PCB 118 C13	104130-40-7	85	102			-	85.60	93.05	104	61		117	78.82	21.16	26.9%	24
PCB 123 C13	208263-64-3	84	NA			57	-	49.89	97	60		NA(3)	70.12	20.90	29.8%	20
PCB 126 C13	208263-65-4	93	79.3	87.2		62	98.80	86.84	115	81		83.0	81.99	25.42	31.0%	27
PCB 156 C13	208263-68-7	88	99.0			-	100.80	93.25	114	66		65.3	77.90	22.32	28.7%	22
PCB 157 C13	235416-30-5	82	87.0			-	108.90	82.77	114	63		NA(3)	76.99	22.14	28.8%	20
PCB 167 C13	208263-69-8	87	NA			60	-	83.48	112	93		NA(3)	76.90	21.68	28.2%	20
PCB 169 C13	208263-70-1	85	95.7			64	-	65.56	119	96		82.2	80.21	24.90	31.0%	25
PCB 189 C13	208263-73-4	83	63.9			56	102.90	89.00	110	90		34.0	75.49	25.45	33.7%	23
PCB 180 C13													86.50	19.10	22.1%	2

NOTE: Laboratory 99225's result for PCB169 (in italics) was excluded from the calculations for the Mean and Standard Deviation.

## FOOTNOTES AND COMMENTS FOR DATA TABLES

The following notes and comments were provided by the participants and were extracted verbatim from the data reports.

### Laboratory 99208

Sample 1 has had an addition of Internal standard and recovery standard (US EPA 1613) in order to quantify the native compounds. It has been diluted by a factor of 1 in 2 and the reported concentrations have had this dilution factor taken into account.

Samples 4-8 were tested for recoveries using US EPA 1613 spiking regime with <sup>13</sup>C compounds. The data for these has been provided in the spreadsheet..

### Laboratory 99216

For the DLPCBs analysis, we spiked with our own labeled internal standard solution, instead of your gift "Sample 3: Ampouled Surrogate".

The concentration of 2,3,7,8-TCDF was confirmed by a DB-225 column.

### Laboratory 99220

- Note 1: 2,3,7,8-Tetrachlorodibenzofuran (TCDF) results not confirmed by DB-225 column.
- Note 2: Results in parentheses (not included in Total for corresponding homologue group) indicate isotopic abundance ratio outside control limits.
- Note 3: Possible PCDPE interferences not indicated in PCDF results.

### Laboratory 99221

Three samples (samples 4,6 and 8) had crystals in it, after extraction. Concentration range for Dioxins and Furans is well chosen, but quite high for PCBs. PCBs have been analyzed using our regular congener method; not all dioxin-like PCBs are included. We have a specific method for IUPAC #77, 126, 169 which is much more specific and sensitive. We nevertheless used the congener method, because more of the compounds you asked for were included. Warning: the list for reporting dioxin congener is not the usual one based on the retention time on a DB5 column; therefore some laboratory may not have noticed the inversion in two of the hexa dioxins.

### Laboratory 99222

- PCB81 concentrations have been calculated using <sup>13</sup>C-PCB77 as surrogate standard
- The value for this PCB (number 81) in sample 7 is only a "tentative" value: there is an interference in this sample at retention time of PCB77 which explains the low recovery of <sup>13</sup>C-PCB77, but it is not representative of PCB81 real recovery
- PCB123 concentration have been calculated using <sup>13</sup>C-PCB118 as surrogate standard
- We didn't used the solution provided of dioxin-like PCB because final volume of 0-ortho and 1-ortho fractions must be different and it wasn't possible to add the same quantity of all of them in the sample.
- The recoveries of PCDD/F are indicated in an additional sheet ("PCDD-F Recoveries") because there wasn't enough space in the original format.

### Laboratory 99233

“\*” DB225 value  
ND Not Detected  
DPE Diphenyl ether interference  
NDR Not detected due to incorrect ratio

### Laboratory 99236

The preparation of these samples was completed with a batch of soils for an on-going project. These samples presented some unusual challenges to the cleanup techniques. The following observations/actions were noted.

After extraction, Sample 7 was lime green in color. After passing this sample through the sodium sulfate drying funnel, the sodium sulfate was slightly brown.

A brown precipitate was found in the extract for Sample 8 following initial concentration step (pre-acid wash).

During KD concentration following acid silica columns, Sample 4, Sample 6, and sample 8 had yellow crystals form in the KD receiver. A mercury cleanup was performed on the dioxin/furan split samples but not on the PCB splits. Analysis of PCB splits was abandoned due to matrix interference most likely due to high sulfur concentration. Analysis of all dioxin-like PCBs came from the dioxin/furan split using a different acquisition program and GC ramp.

Please review the footnotes presented at bottom of data report.

### Dioxin/Furan Footnotes

- (1) Non detect. Peak is buried under larger peak. Not integratable.
- (2) Possible polychlorinated diphenyl ether interference present above 10% of native analyte.
- (3) Estimated maximum possible concentration (EMPC). Peak not qualitatively identified as native.

### PCB Footnotes

- 1 Saturated in both ion channels. Reported result is an estimate.
- 2 Not calculated. Carryover from saturated native channel causes interference.
- 3 Not applicable.  $^{13}\text{C}$  isomer not used in quantitation.

7 APPENDIX 2: GRAPHS FOR SAMPLES 1 AND 2

# INJECTION STANDARDS

## 2,3,7,8-TCDD

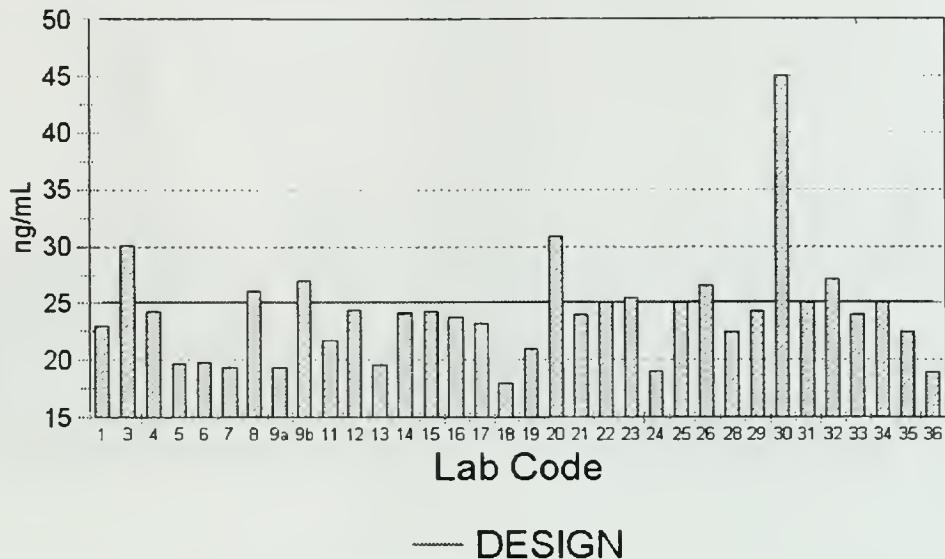


Figure 1: Sample 1 - 2,3,7,8-TCDD

# INJECTION STANDARDS

## 1,2,3,7,8-PeCDD

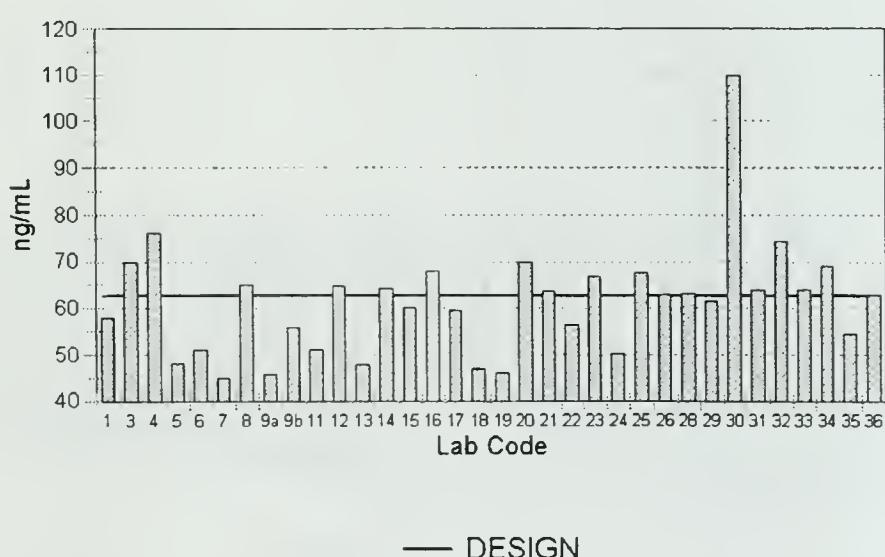


Figure 2: Sample 1 - 1,2,3,7,8-PeCDD

# INJECTION STANDARDS

## 1,2,3,4,7,8-HxCDD

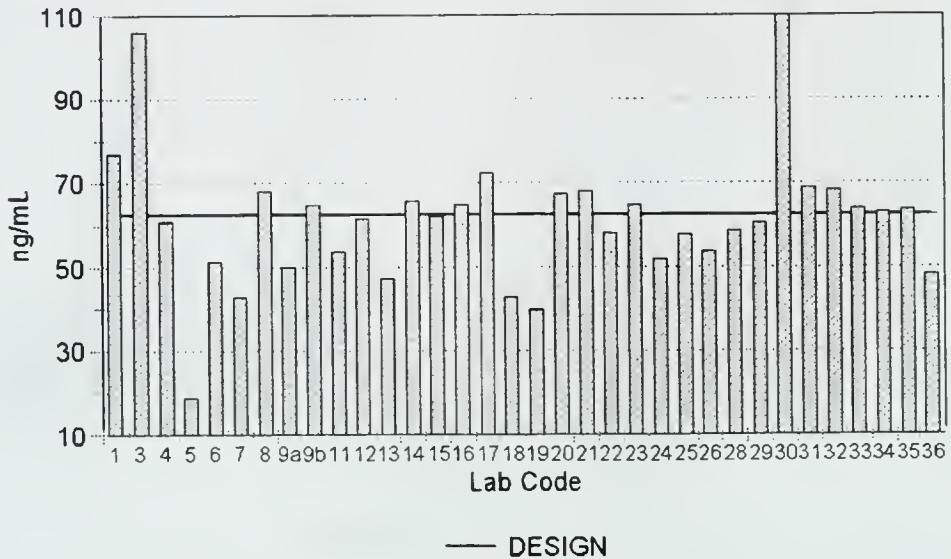


Figure 3: Sample 1 - 1,2,3,4,7,8-HxCDD

# INJECTION STANDARDS

## 1,2,3,6,7,8-HxCDD

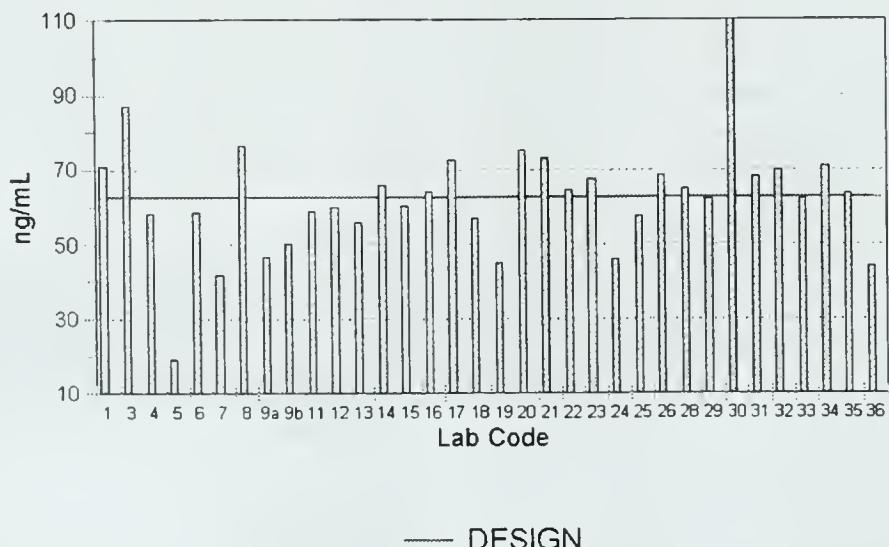


Figure 4: Sample 1 - 1,2,3,6,7,8-HxCDD

# INJECTION STANDARDS

## 1,2,3,7,8,9-HxCDD

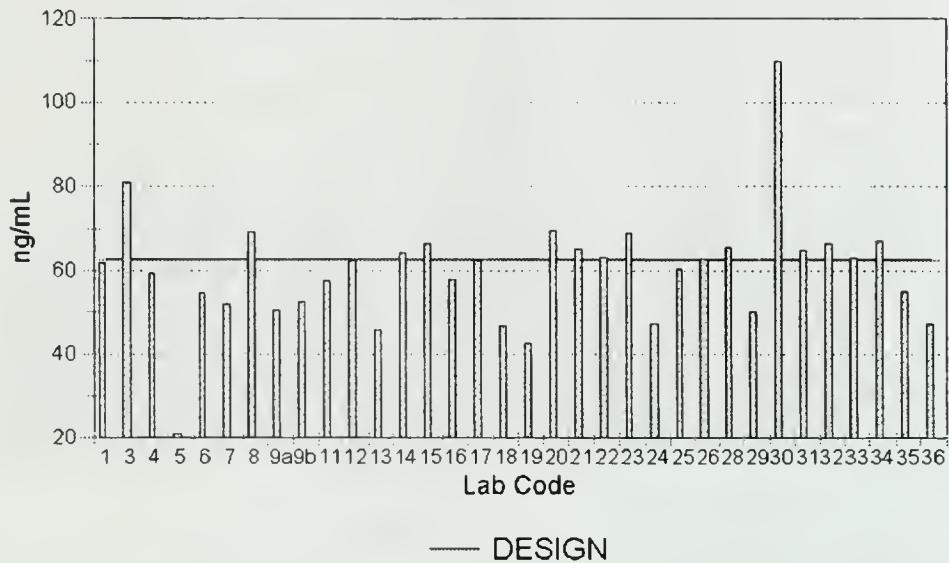


Figure 5: Sample 1 - 1,2,3,7,8,9-HxCDD

# INJECTION STANDARDS

## 1,2,3,4,6,7,8-HpCDD

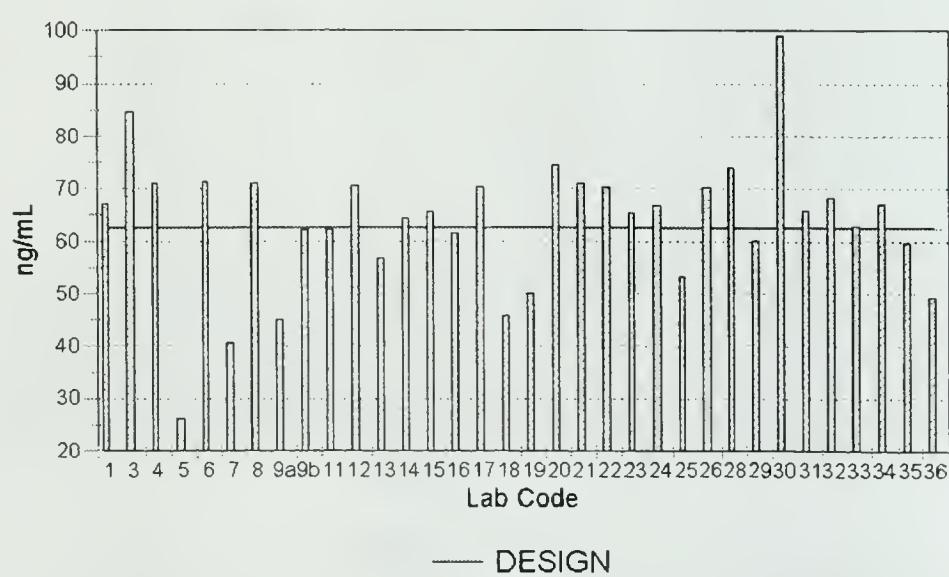


Figure 6: Sample 1 - 1,2,3,4,6,7,8-HpCDD

# INJECTION STANDARDS

## 1,2,3,4,5,6,7,8-OCDD

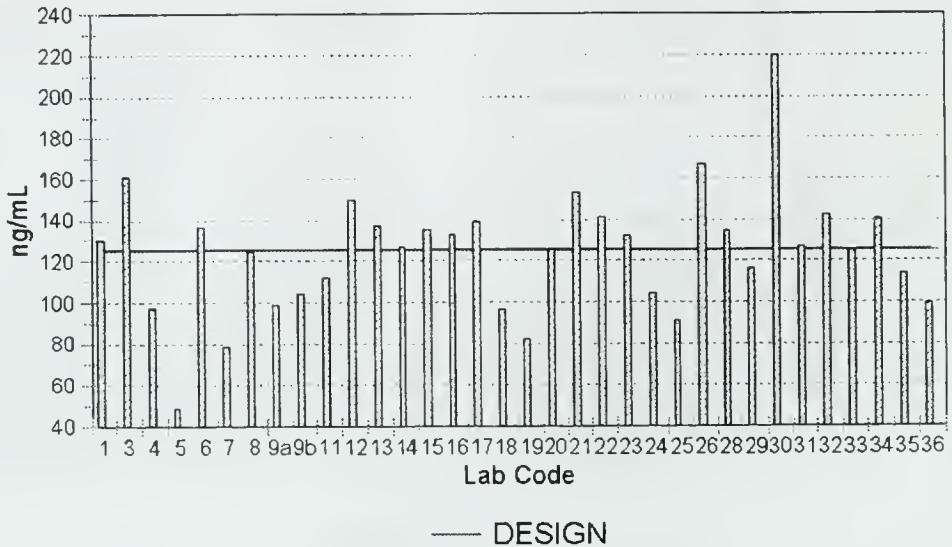


Figure 7: Sample 1 - 1,2,3,4,5,6,7,8-OCDD

# INJECTION STANDARDS

## 2,3,7,8-TCDF

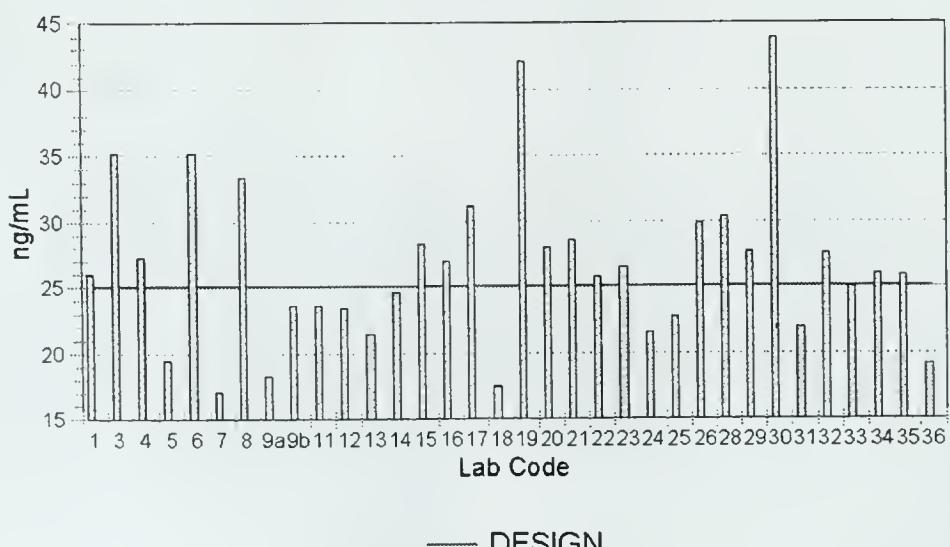


Figure 8: Sample 1 - 2,3,7,8-TCDF

# INJECTION STANDARDS

## 1,2,3,7,8-PeCDF

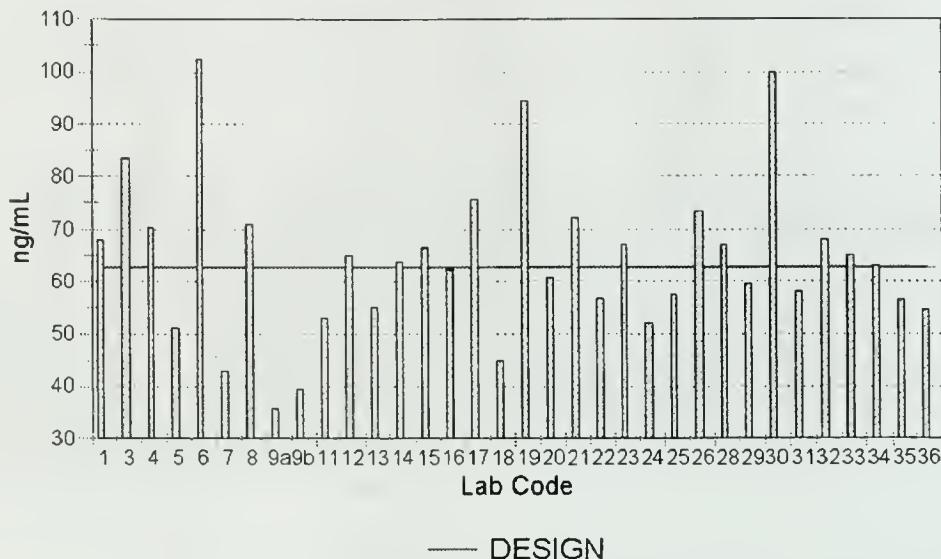


Figure 9: Sample 1 - 1,2,3,7,8-PeCDF

# INJECTION STANDARDS

## 2,3,4,7,8-PeCDF

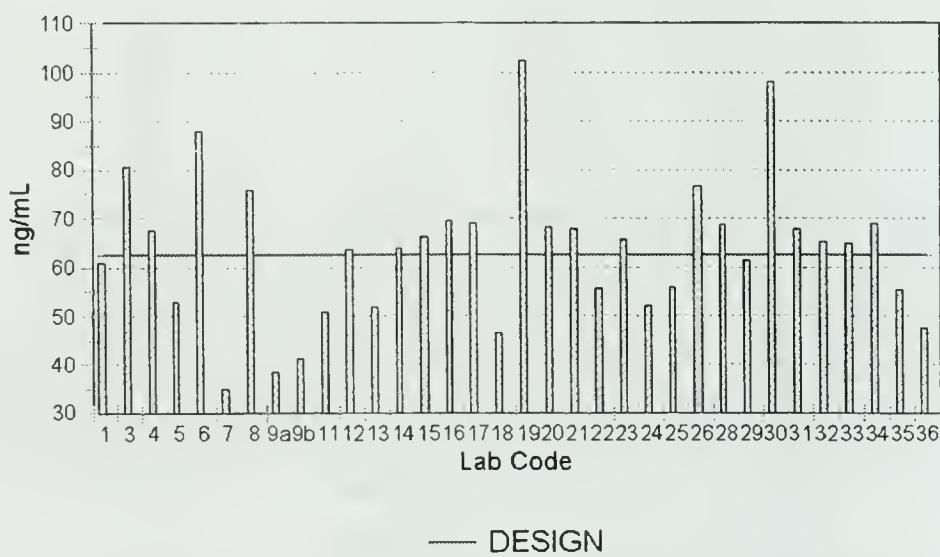


Figure 10: Sample 1 - 2,3,4,7,8-PeCDF

# INJECTION STANDARDS

## 1,2,3,4,7,8-HxCDF

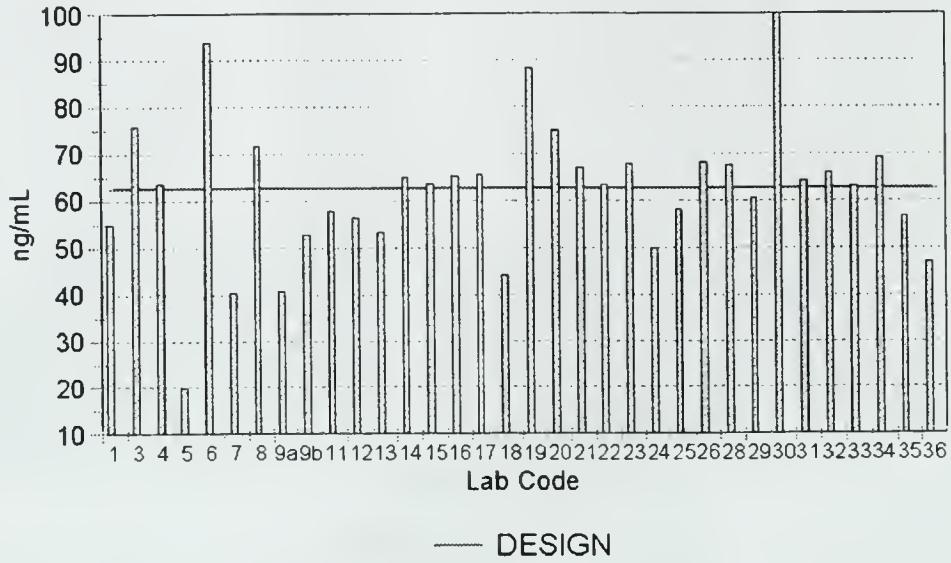


Figure 11: Sample 1 - 1,2,3,4,7,8-HxCDF

# INJECTION STANDARDS

## 1,2,3,6,7,8-HxCDF

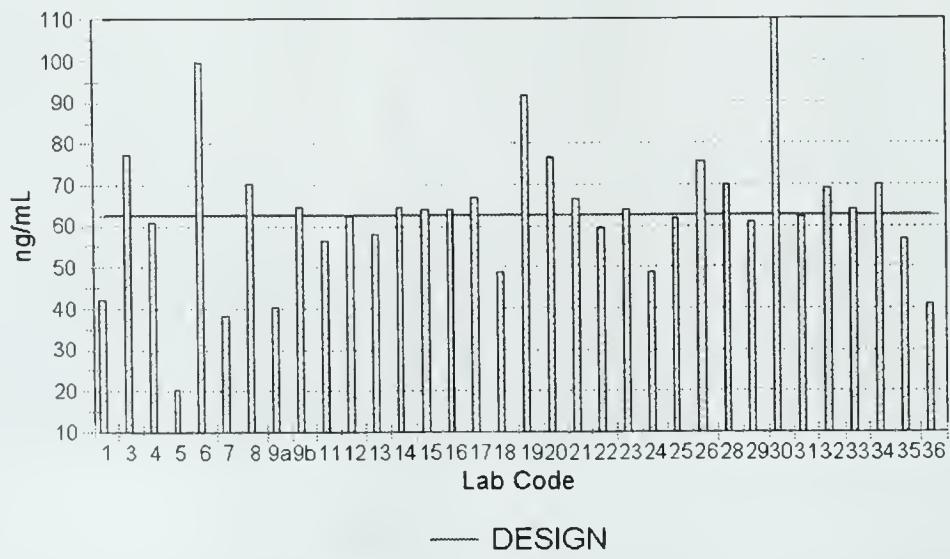


Figure 12: Sample 1 - 1,2,3,6,7,8-HxCDF

# INJECTION STANDARDS

## 1,2,3,7,8,9-HxCDF

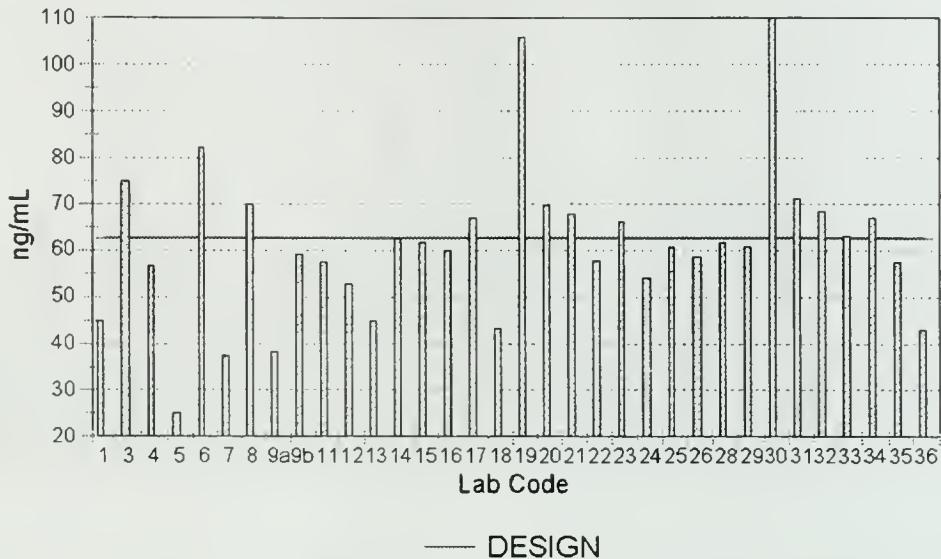


Figure 13: Sample 1 - 1,2,3,7,8,9-HxCDF

# INJECTION STANDARDS

## 2,3,4,6,7,8-HxCDF

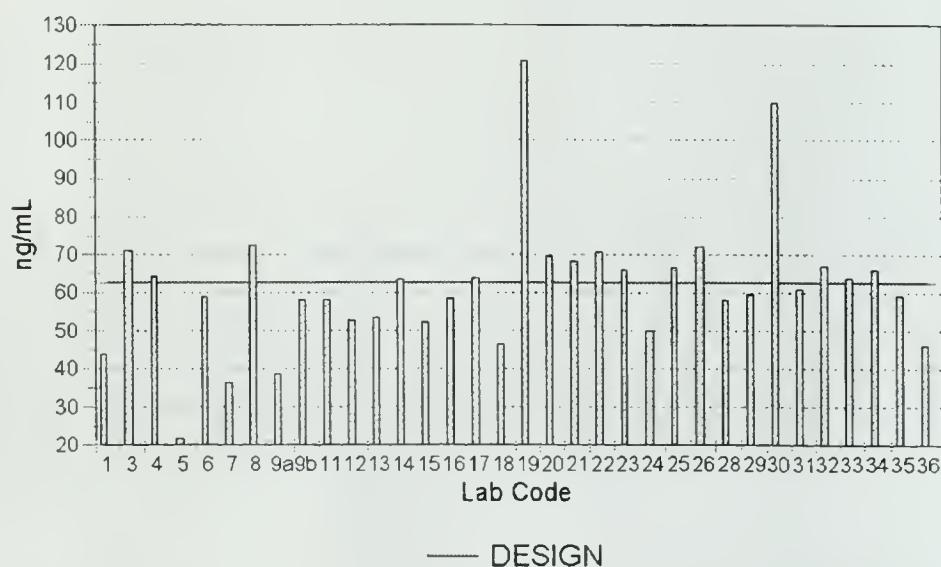


Figure 14: Sample 1 - 2,3,4,6,7,8-HxCDF

# INJECTION STANDARDS

## 1,2,3,4,6,7,8-HpCDF

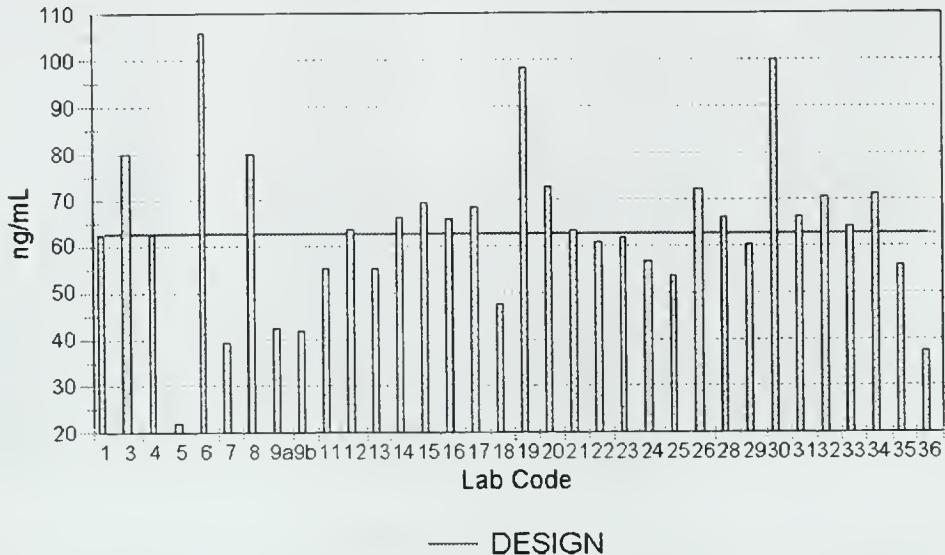


Figure 15: Sample 1 - 1,2,3,4,6,7,8-HpCDF

# INJECTION STANDARDS

## 1,2,3,4,7,8,9-HpCDF

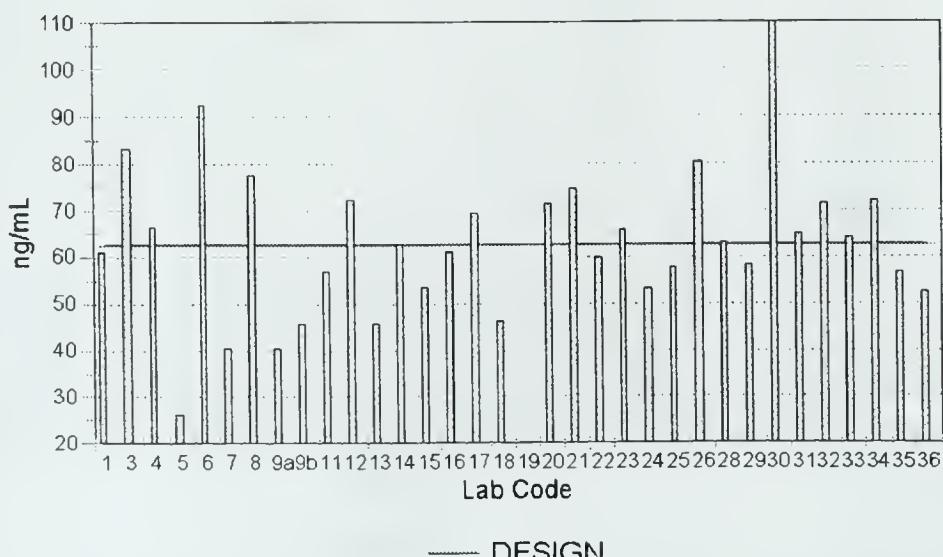


Figure 16: Sample 1 - 1,2,3,4,7,8,9-HpCDF

# INJECTION STANDARDS

1,2,3,4,5,6,7,8-OCDF

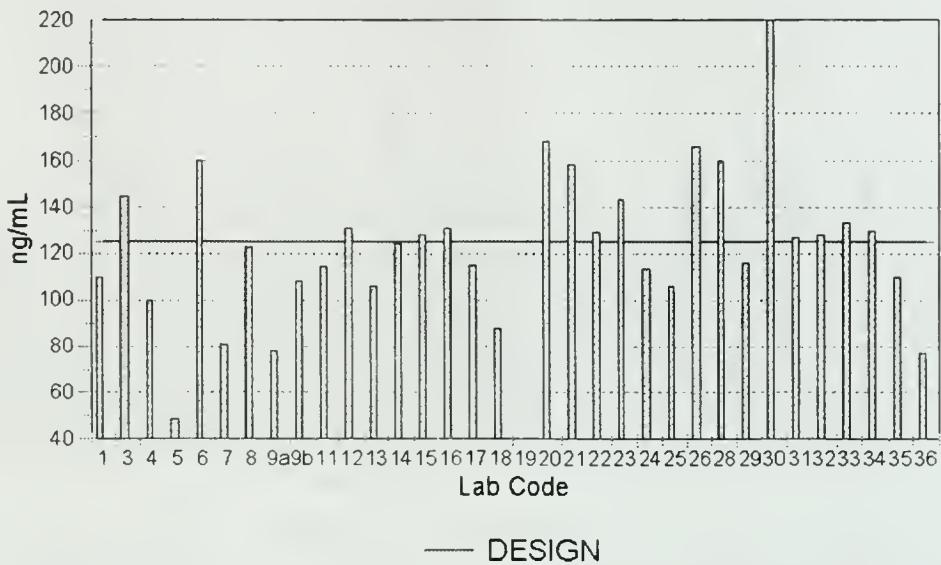


Figure 17: 1,2,3,4,5,6,7,8-OCDF

# INJECTION STANDARDS

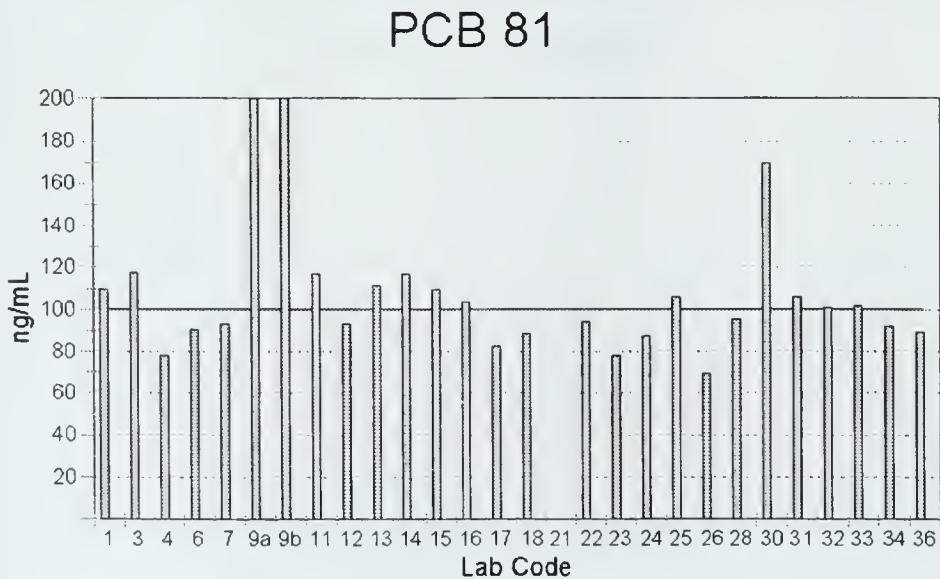
## PCB 77



Figure 18: Sample 2 - PCB77

# INJECTION STANDARDS

## PCB 81



NOTE: Lab 9a - 465, Lab 9b - 1170

— DESIGN

Figure 19: Sample 2 - PCB81

# INJECTION STANDARDS

## PCB 105

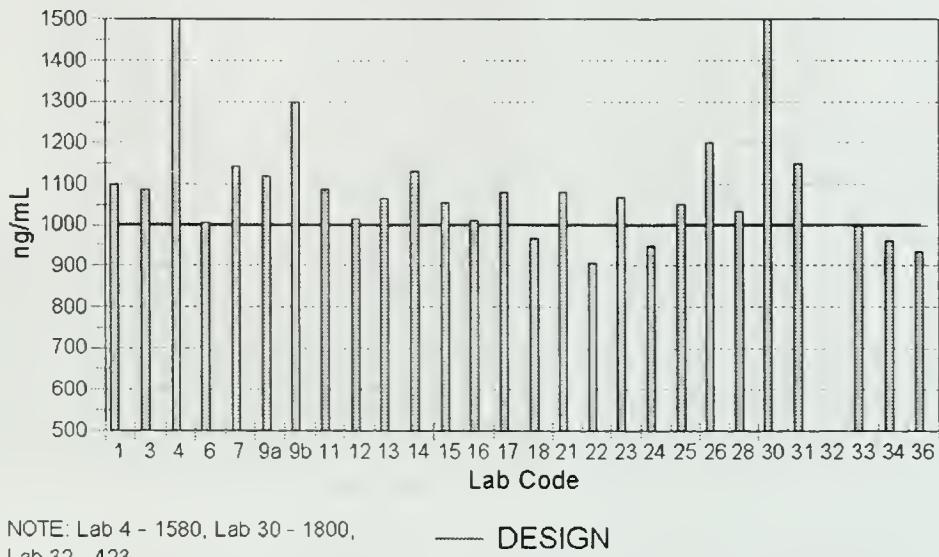


Figure 20: Sample 2 - PCB105

# INJECTION STANDARDS

## PCB 114

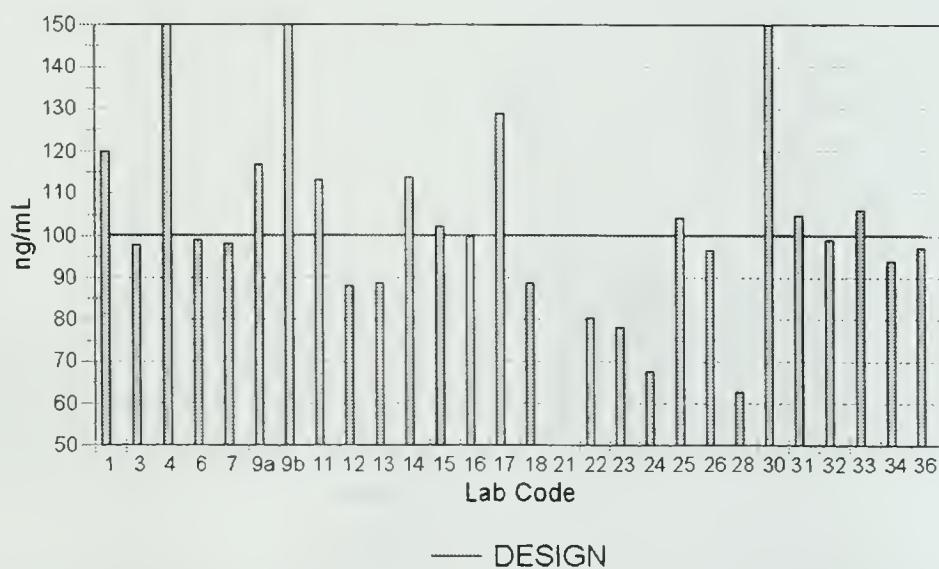


Figure 21: Sample 2 - PCB114

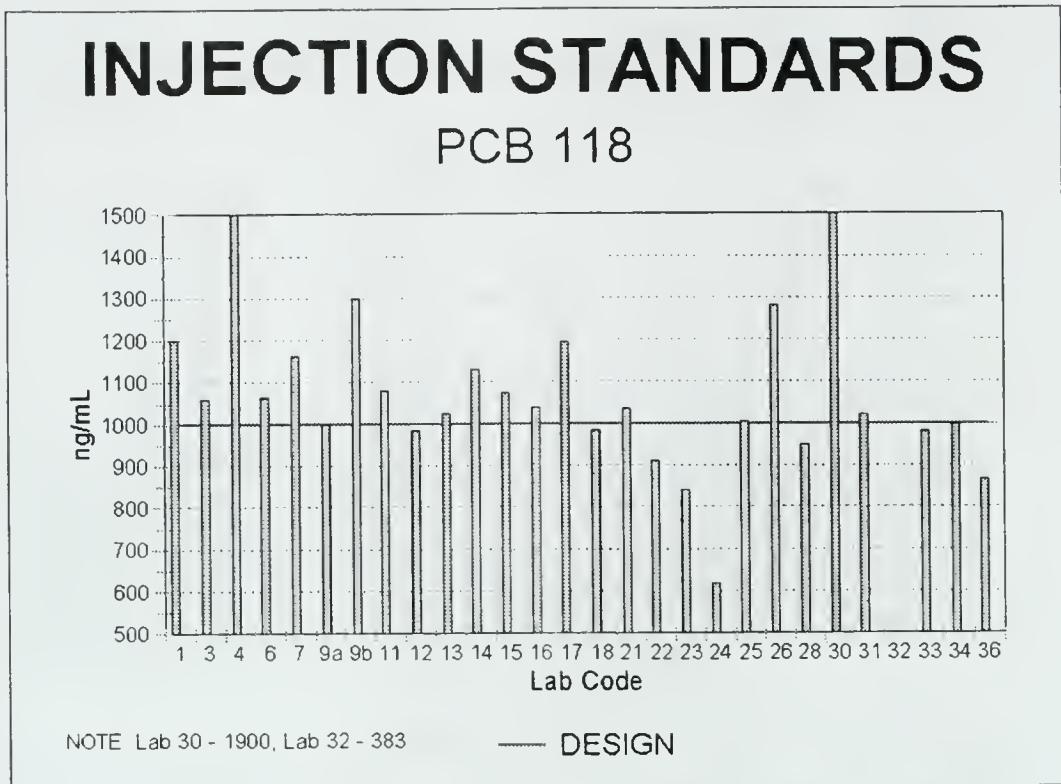


Figure 22: Sample 2 - PCB118

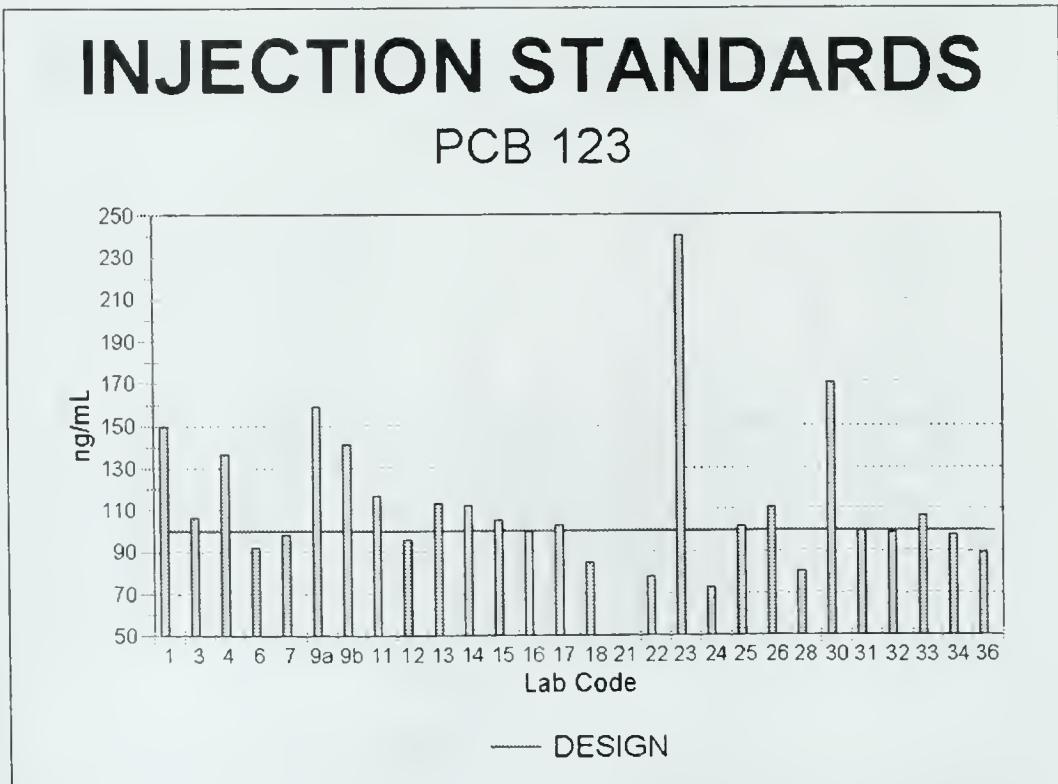


Figure 23: Sample 2 - PCB123

# INJECTION STANDARDS

## PCB 126

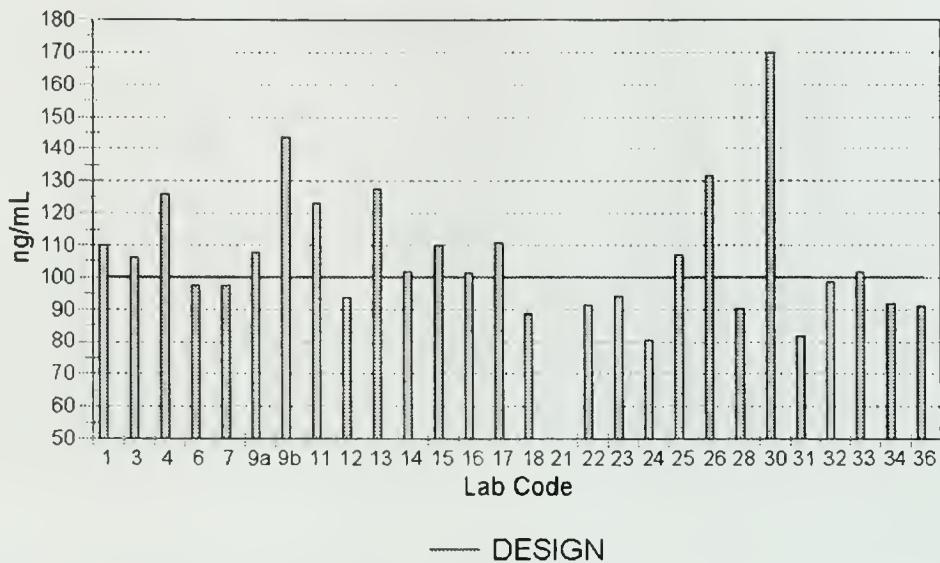


Figure 24: Sample 2 - PCB126

# INJECTION STANDARDS

## PCB 156

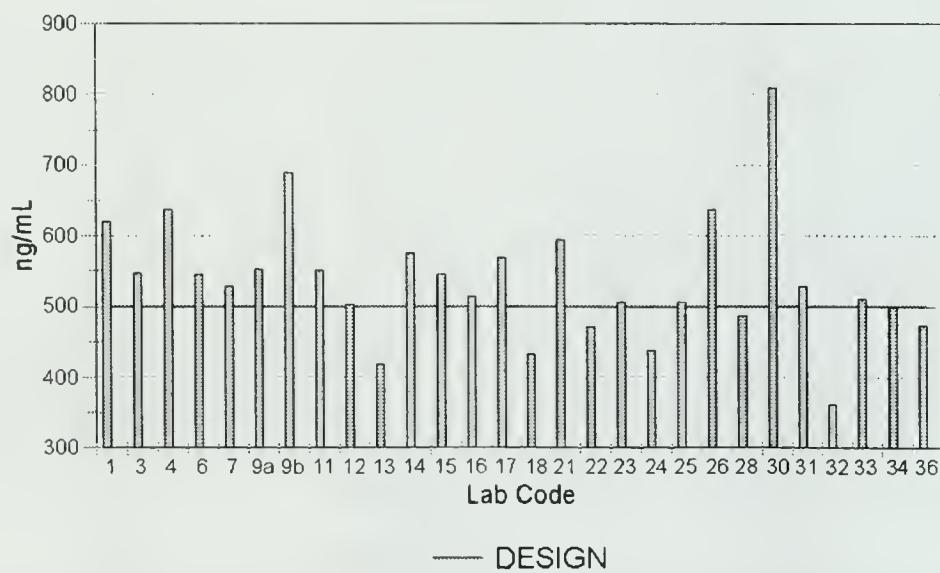


Figure 25: Sample 2 - PCB156

# INJECTION STANDARDS

## PCB 157

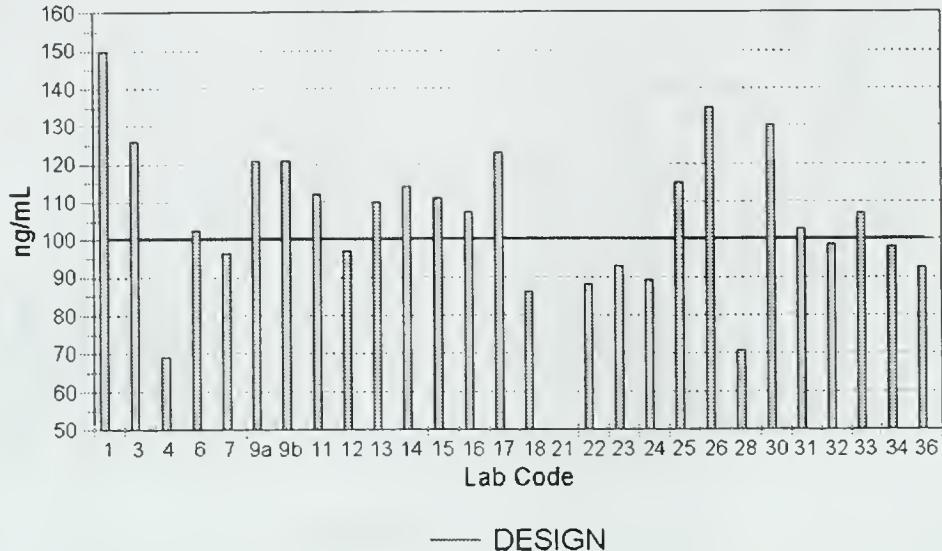


Figure 26: Sample 2 - PCB157

# INJECTION STANDARDS

## PCB 167

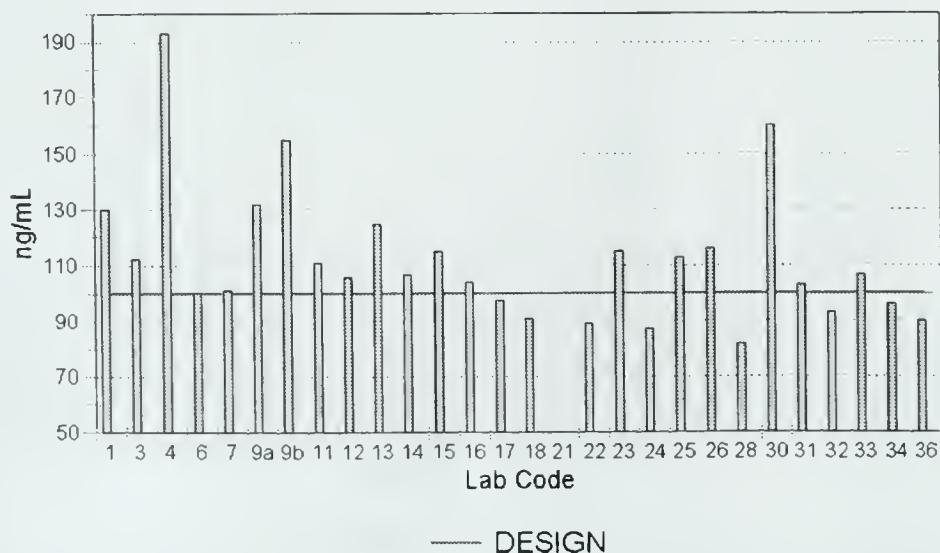


Figure 27: Sample 2 - PCB167

# INJECTION STANDARDS

## PCB 169

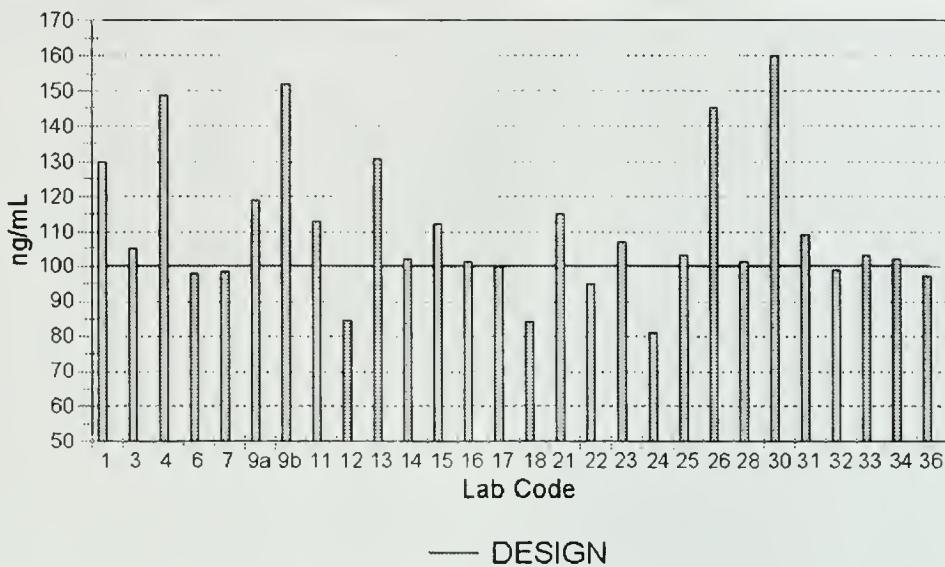


Figure 28: Sample 2 - PCB169

# INJECTION STANDARDS

## PCB 189

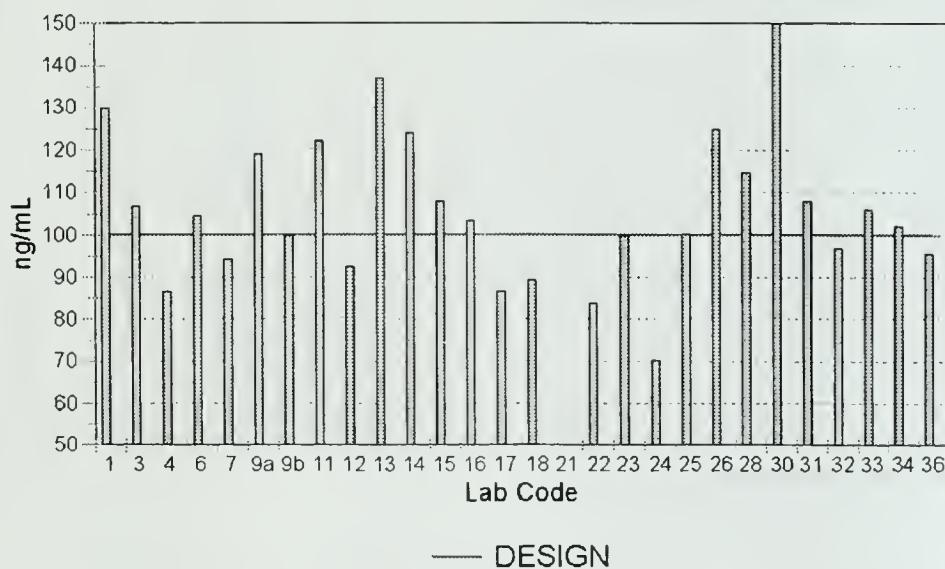


Figure 29: Sample 2 - PCB189

## 8 APPENDIX 3: CERTIFIED VALUES OF LSBRM9801

TABLE 8 – Assignment of Reference Values for LSBRM9801

	Parameter	Assigned value and uncertainty	Number of data points	Coefficient of variance
1	2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	17.7 ± 5.6	69	15.8%
2	1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	7.96 ± 2.8	67	17.7%
3	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	8.66 ± 2.7	62	15.6%
4	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	20.8 ± 4.8	62	11.6%
5	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	17.3 ± 8.0	66	22.9%
6	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	293 ± 63	66	10.7%
7	1,2,3,4,5,6,7,8-Octachlorodibenzo-p-dioxin (OCDD)	1899 ± 456	69	12.0%
8	2,3,7,8-Tetrachlorodibenzofuran (TCDF)	52.5 ± 16	31	15.0%
9	1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	12.6 ± 5	65	19.9%
10	2,3,4,7,8-Pentachlorodibenzofuran (PcCDF)	18.5 ± 6	61	16.6%
11	1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	67.3 ± 24	66	17.8%
12	1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	20.3 ± 8.7	64	22.0%
13*	1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	2.68* ± 4.0	44	74.0%
14	2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	16 ± 8	63	25.0%
15	1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	299 ± 73	68	12.2%
16	1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	15.1 ± 4.6	64	15.1%
17	1,2,3,4,5,6,7,8-Octachlorodibenzofuran (OCDF)	509 ± 157	65	15.4%
18	Total Tetrachlorodibenzo-p-dioxins (TCDD)	60.1 ± 25	26	21.0%
19	Total Pentachlorodibenzo-p-dioxins (PeCDD)	69.5 ± 23	22	16.3%
20	Total Hexachlorodibenzo-p-dioxins (HxCDD)	238 ± 86	24	17.8%
21	Total Heptachlorodibenzo-p-dioxins (HpCDD)	608 ± 152	25	12.4%
22	Total Tetrachlorodibenzofurans (TCDF)	374 ± 162	23	21.7%
23	Total Pentachlorodibenzofurans (PeCDF)	225 ± 113	24	25.1%
24	Total Hexachlorodibenzofurans (HxCDF)	262 ± 95	24	18.0%
25	Total Heptachlorodibenzofurans (HpCDF)	411 ± 100	24	12.1%
26	PCB 77	1717 ± 520	26	15.0%
27*	PCB 81	75* ± 79	22	53.0%
28	PCB 105	3998 ± 951	48	12.0%
29	PCB 114	207 ± 128	46	31.0%
30	PCB 118	8115 ± 1663	42	10.0%
31	PCB 123	209 ± 191	41	46.0%
32	PCB 126	84.9 ± 35	43	21.0%
33	PCB 156	715 ± 248	51	17.0%
34	PCB 157	186 ± 81	49	22.0%
35	PCB 167	330 ± 85	36	13.0%
36	PCB 169	7.97 ± 5.3	42	33.0%
37	PCB 189	85.2 ± 17.8	36	10.0%

\* Provisional values for information only

**9 APPENDIX 4: GRAPHS FOR SAMPLES 4 AND 6 (LSBRM9801)**

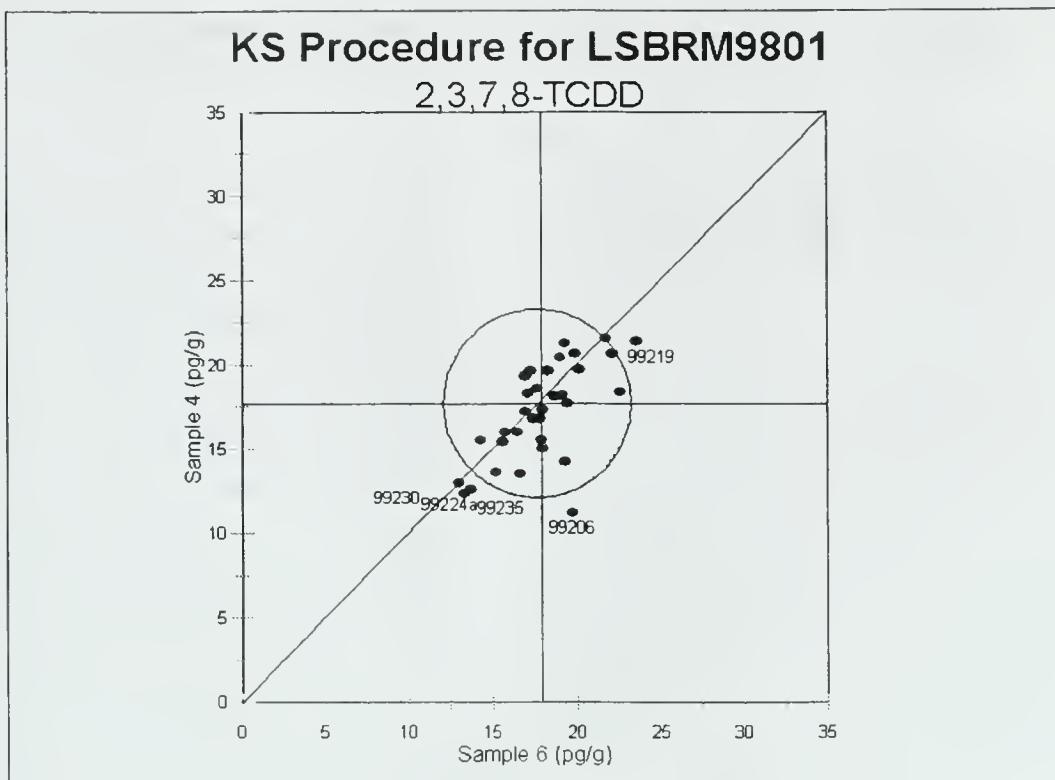


Figure 30: 2,3,7,8-TCDD in Samples 4 and 6

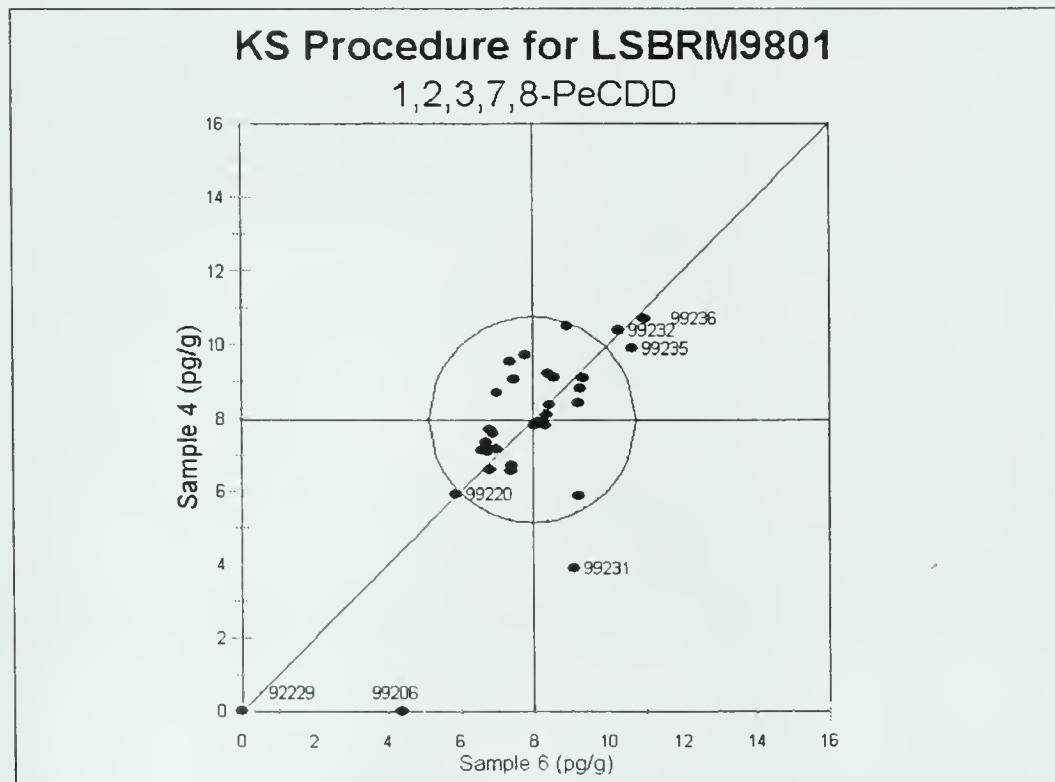


Figure 31: 1,2,3,7,8-PeCDD in Samples 4 and 6

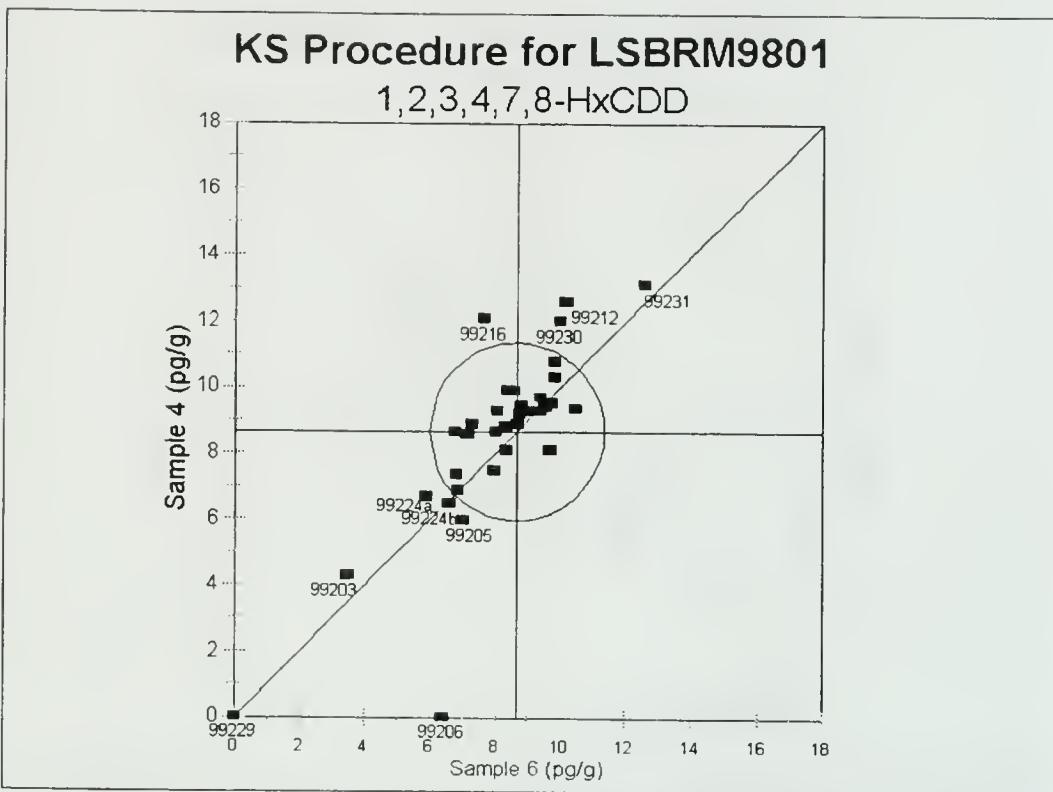


Figure 32: 1,2,3,4,7,8-HxCDD in Samples 4 and 6

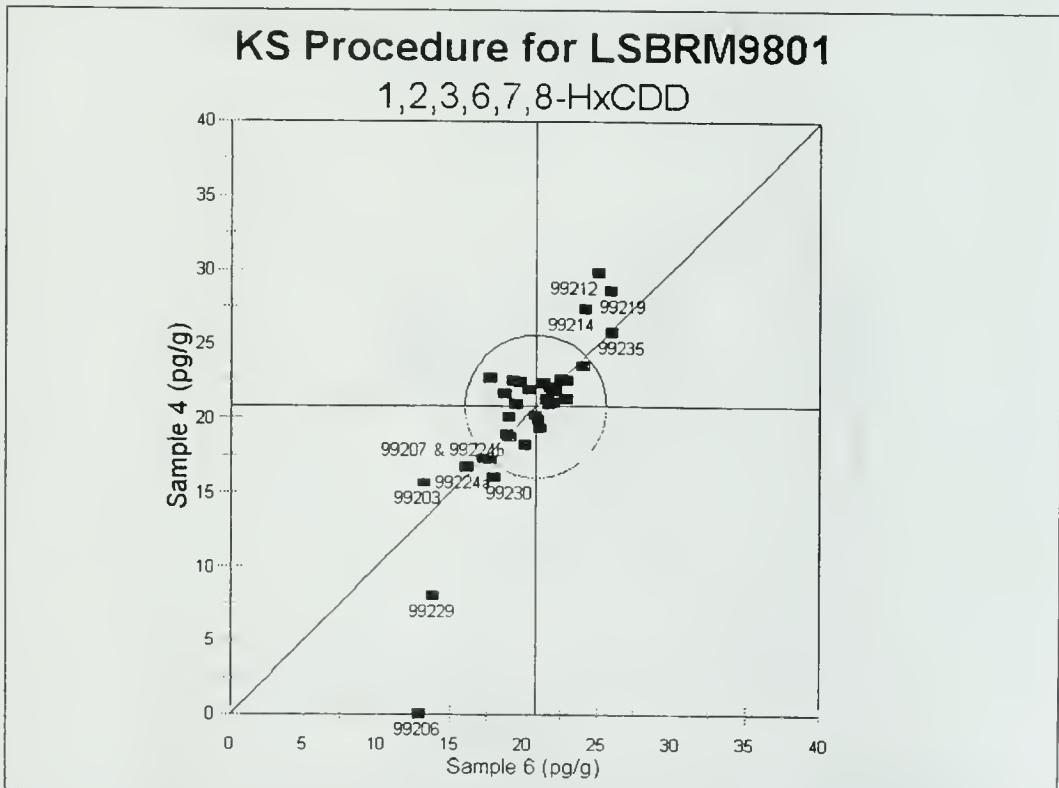


Figure 33: 1,2,3,6,7,8-HxCDD in Samples 4 and 6

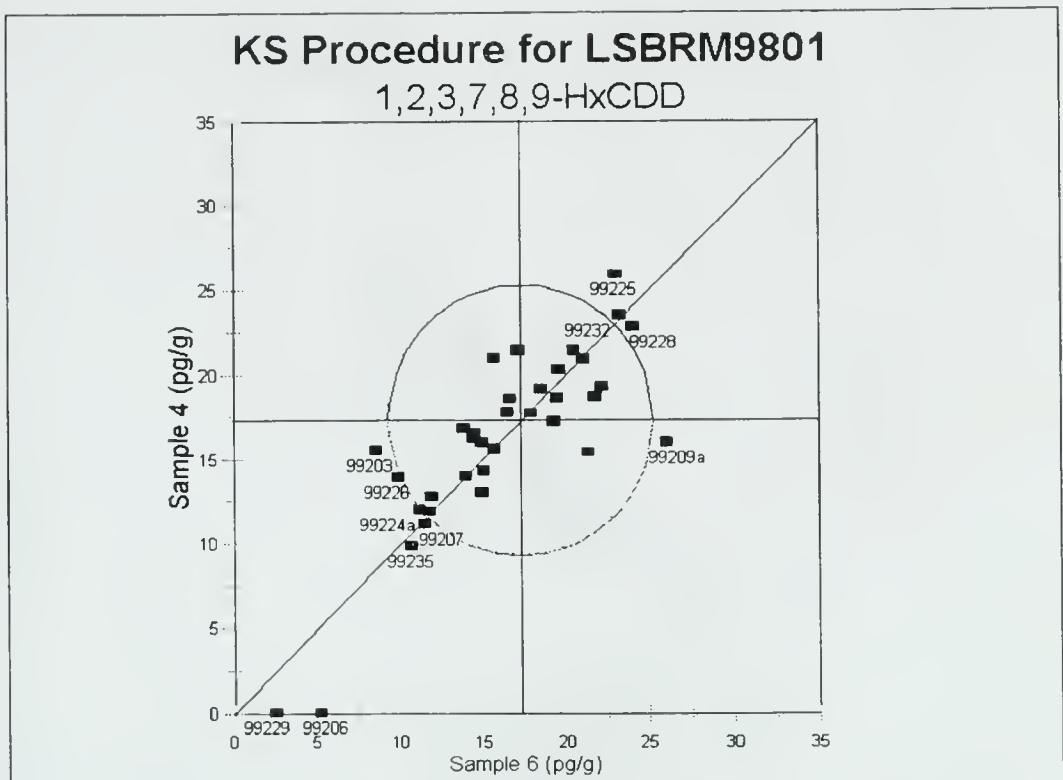


Figure 34: 1,2,3,7,8,9-HxCDD in Samples 4 and 6

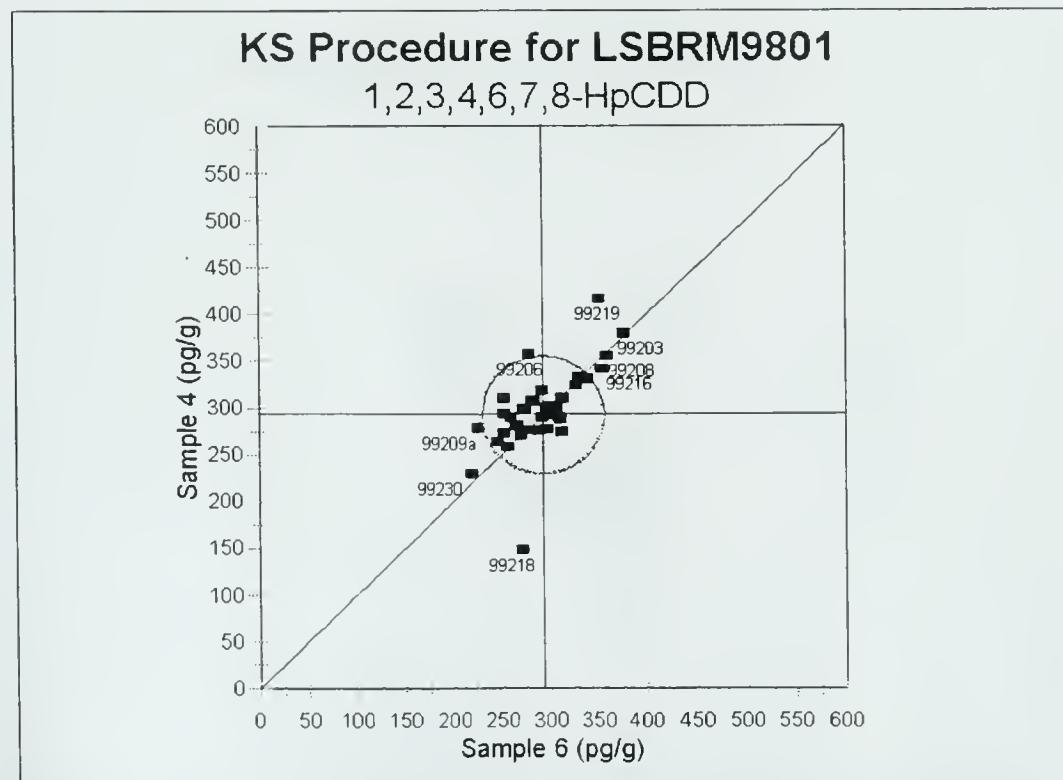


Figure 35: 1,2,3,4,6,7,8-HpCDD in Samples 4 and 6

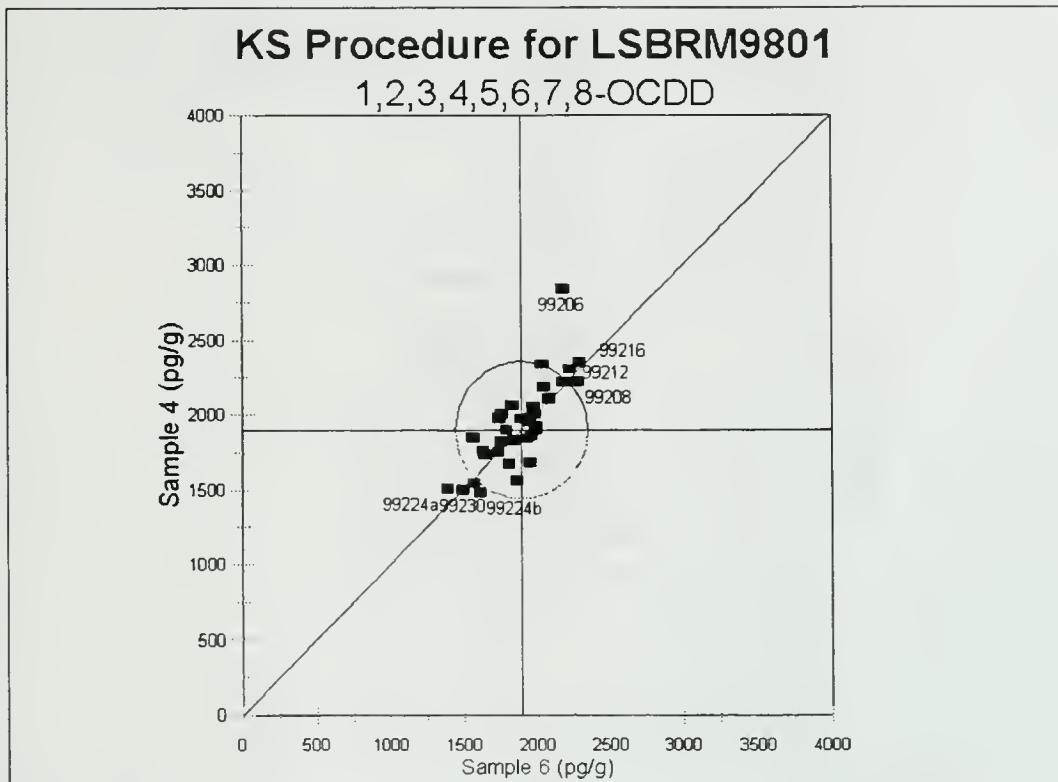


Figure 36: 1,2,3,4,5,6,7,8-OCDD in Samples 4 and 6

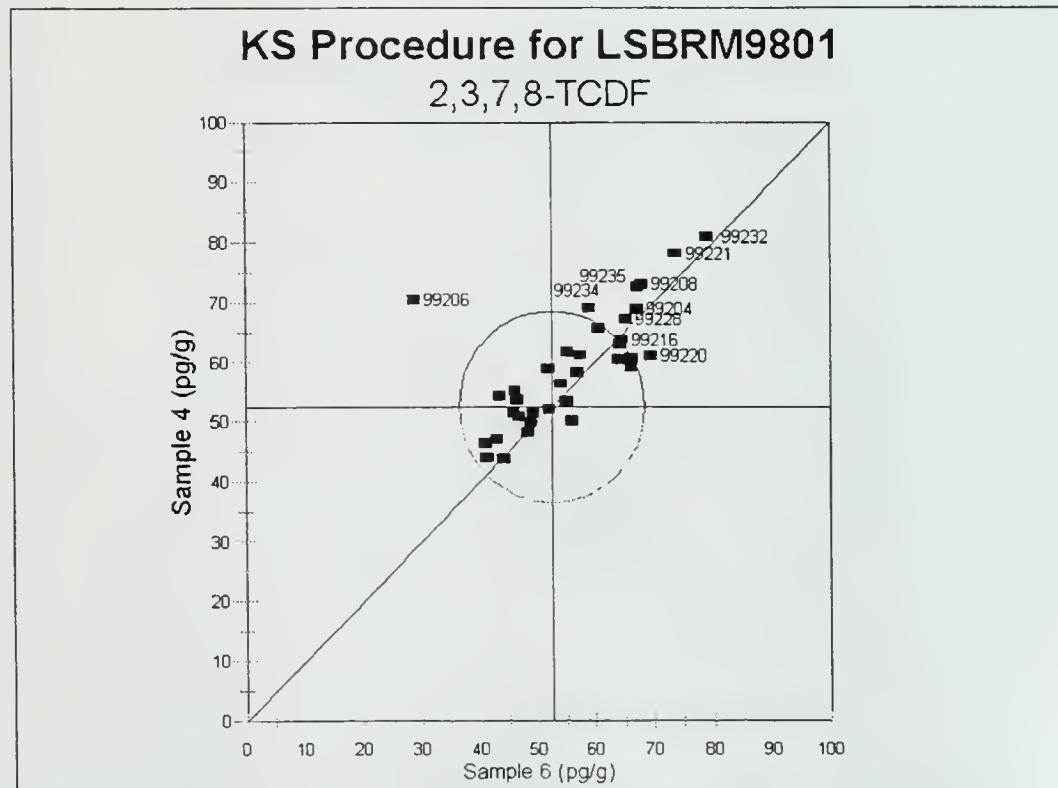


Figure 37: 2,3,7,8-TCDF in Samples 4 and 6

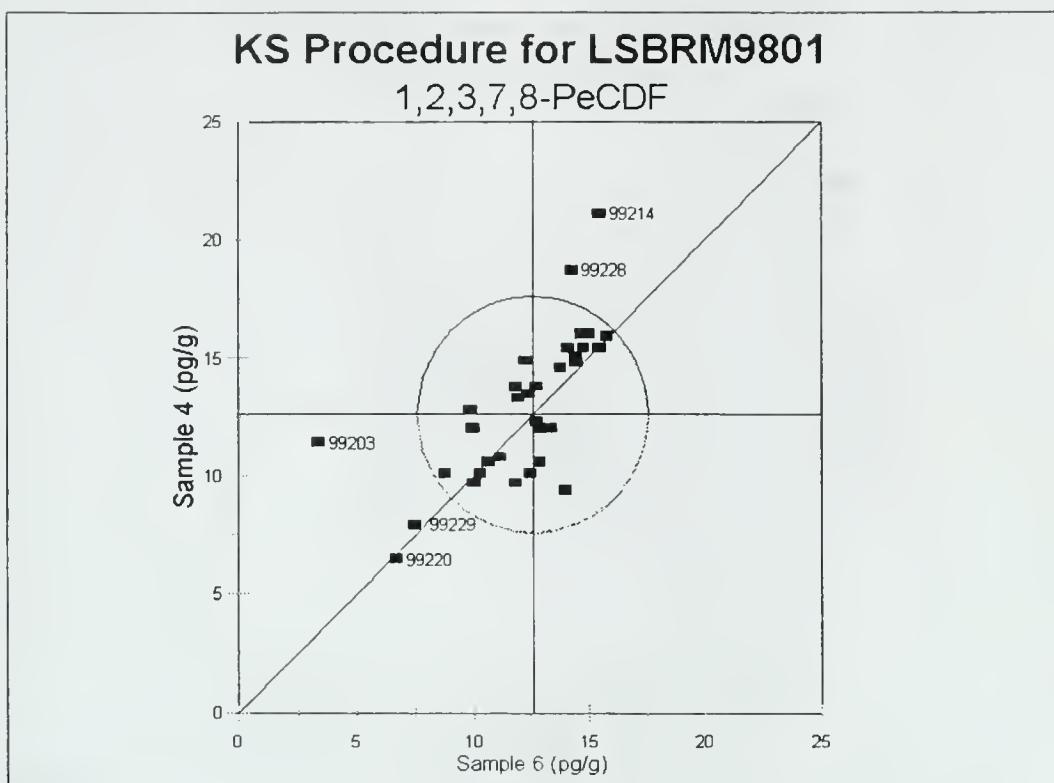


Figure 38: 1,2,3,7,8-PeCDF in Samples 4 and 6

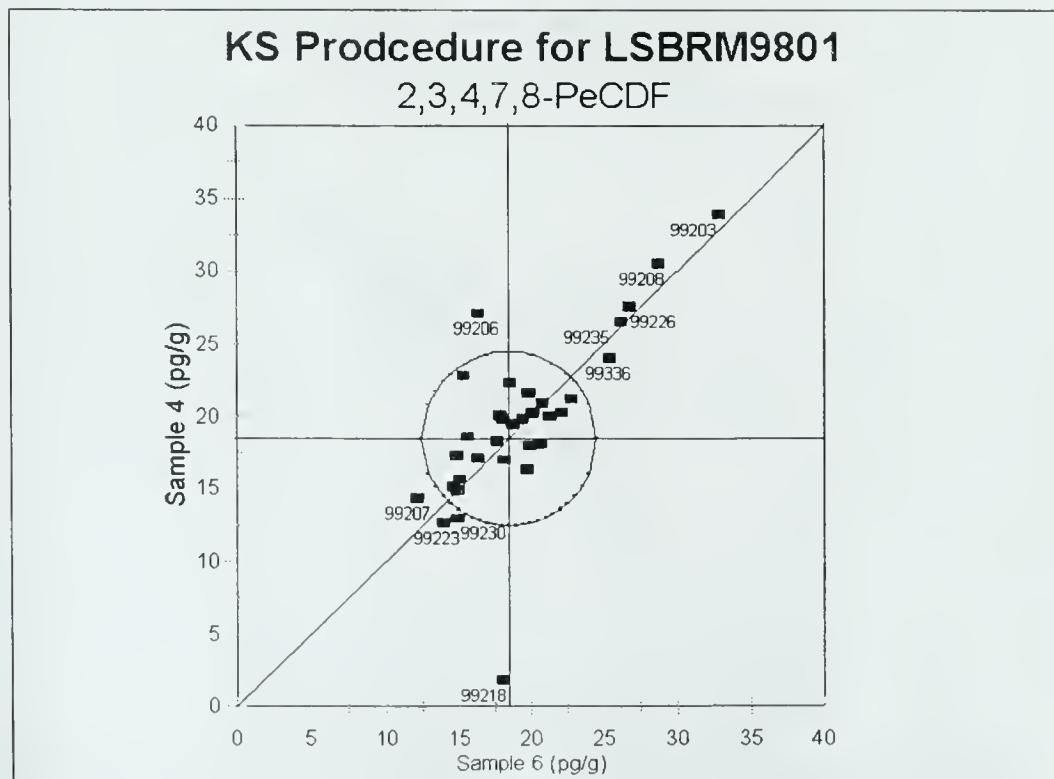


Figure 39: 2,3,4,7,8-PeCDF in Samples 4 and 6

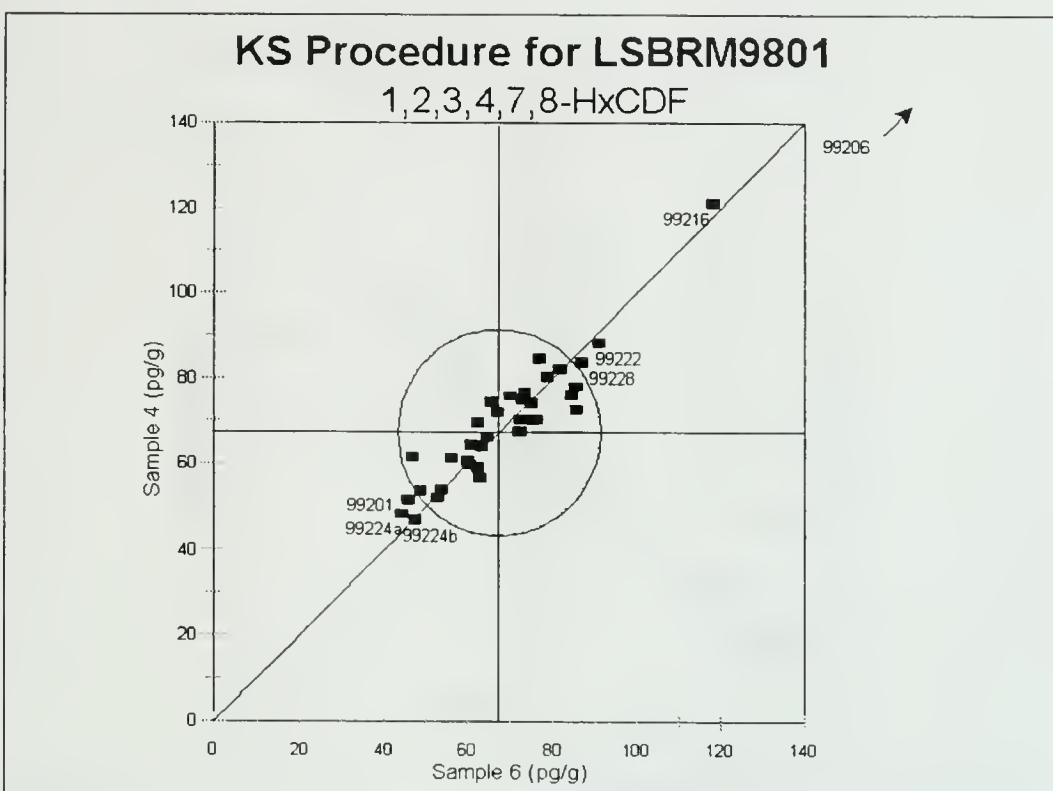


Figure 40: 1,2,3,4,7,8-HxCDF in Samples 4 and 6

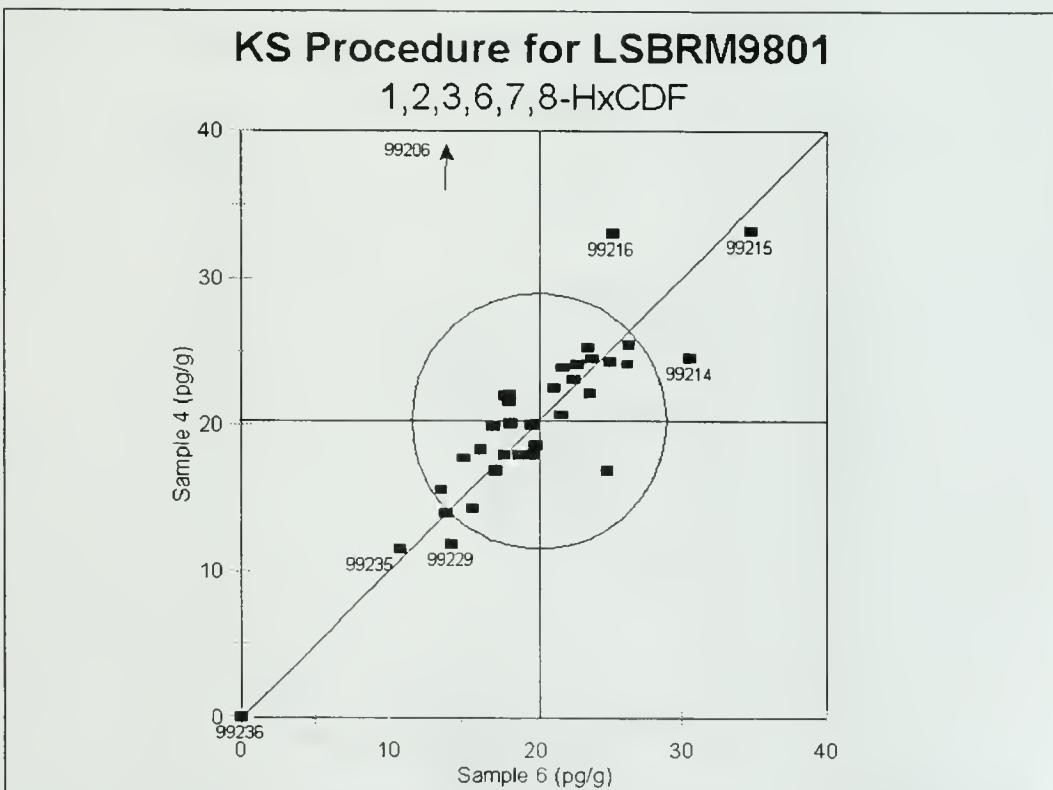


Figure 41: 1,2,3,6,7,8-HxCDF in Samples 4 and 6

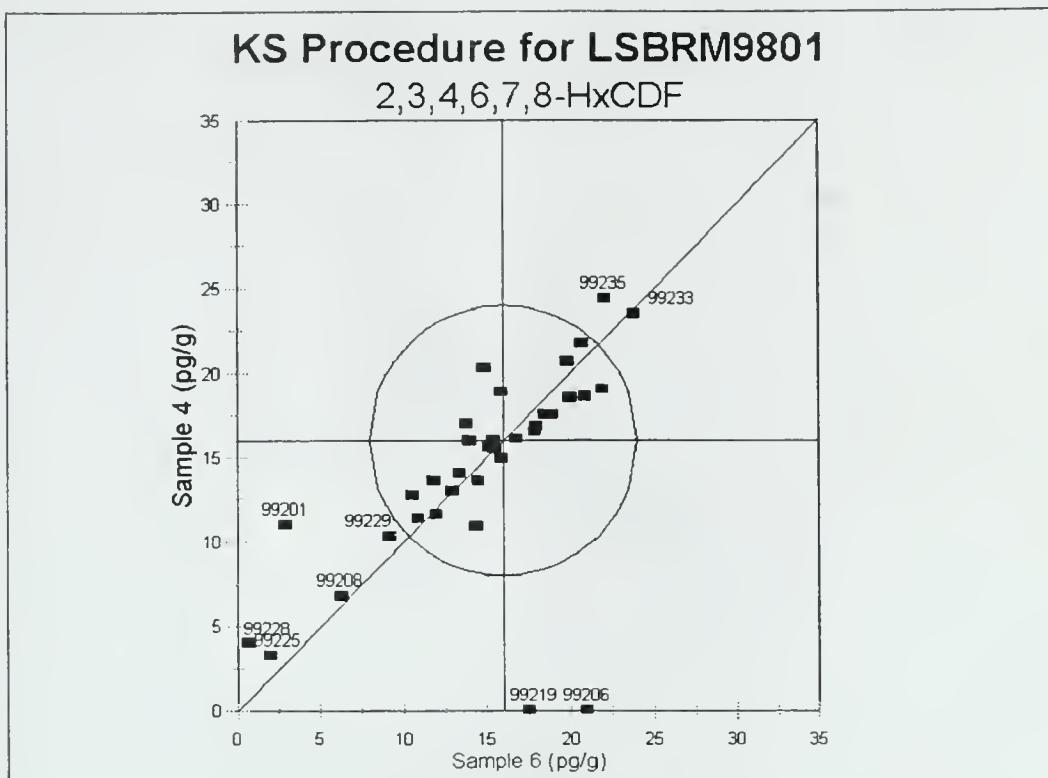


Figure 42: 2,3,4,6,7,8-HxCDF in Samples 4 and 6

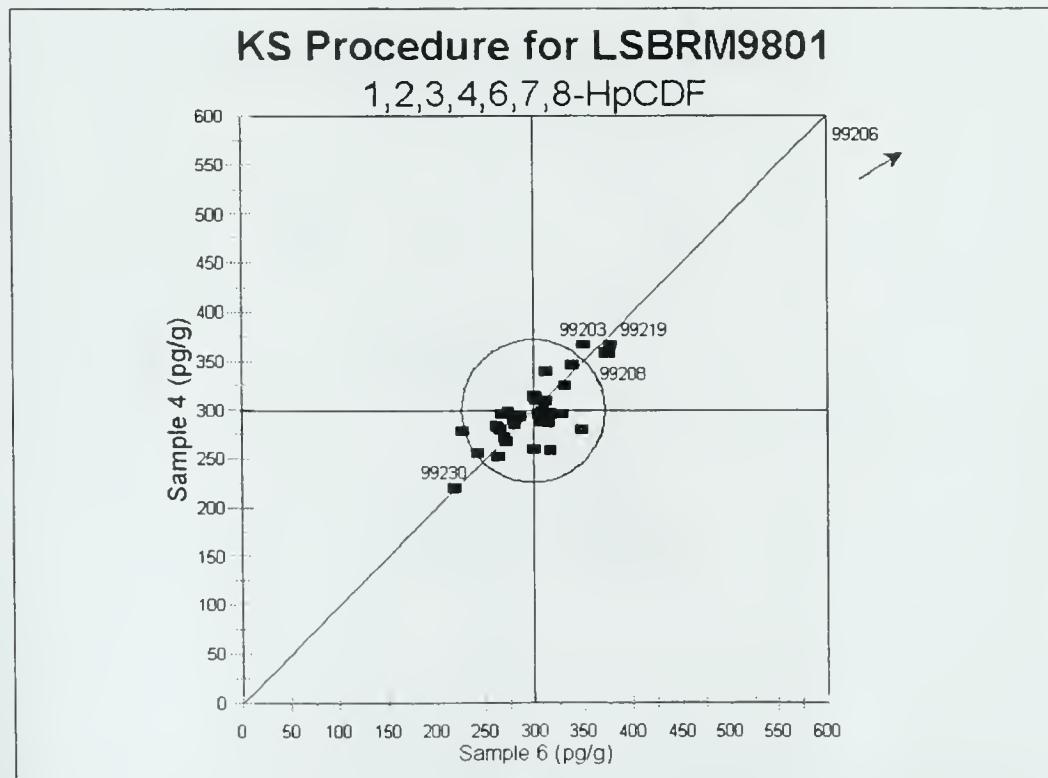


Figure 43: 1,2,3,4,6,7,8-HpCDF in Samples 4 and 6

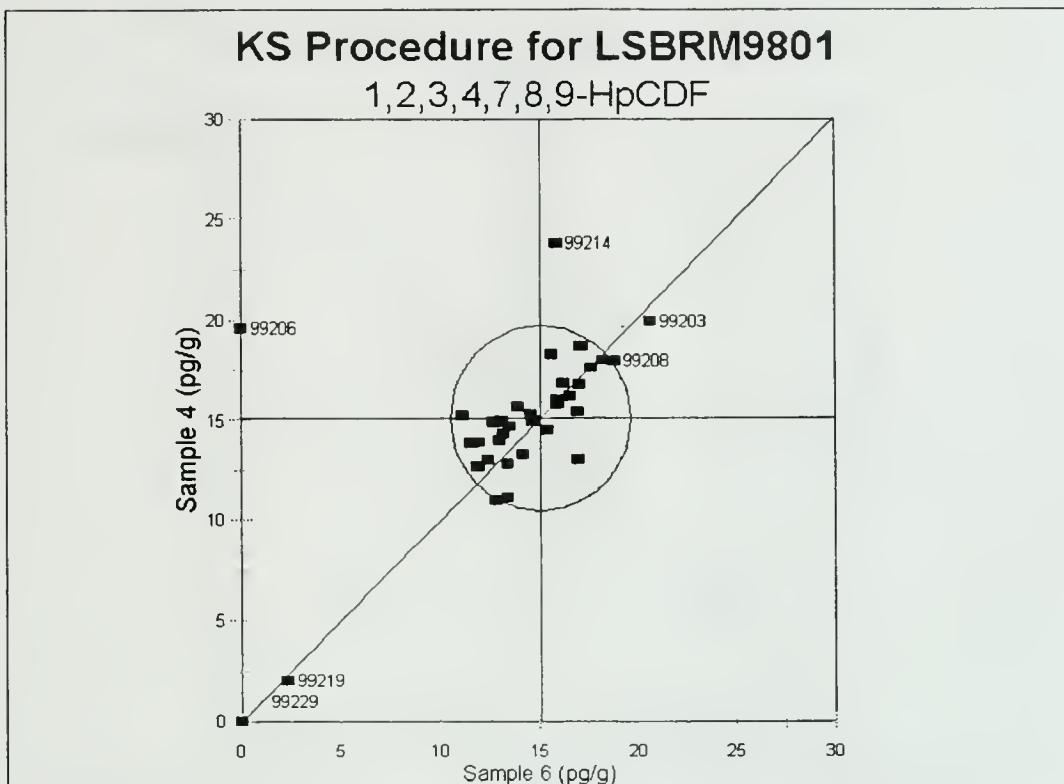


Figure 44: 1,2,3,4,7,8,9-HpCDF in Samples 4 and 6

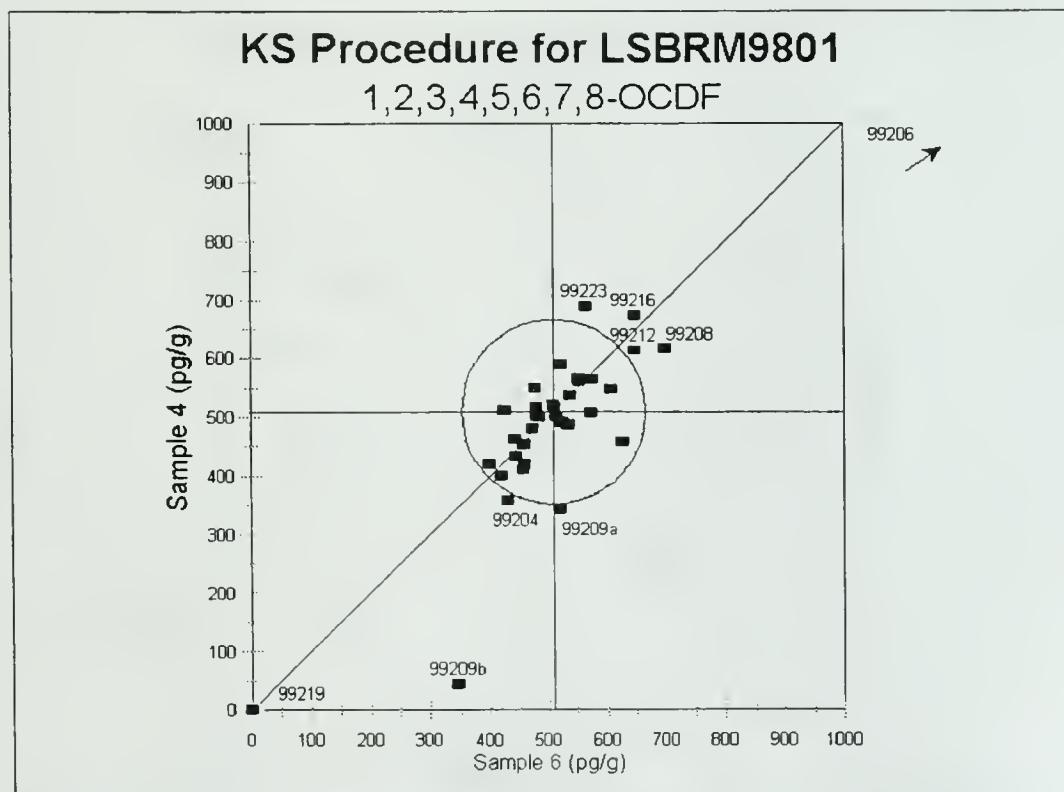


Figure 45: 1,2,3,4,5,6,7,8-OCDF in Samples 4 and 6

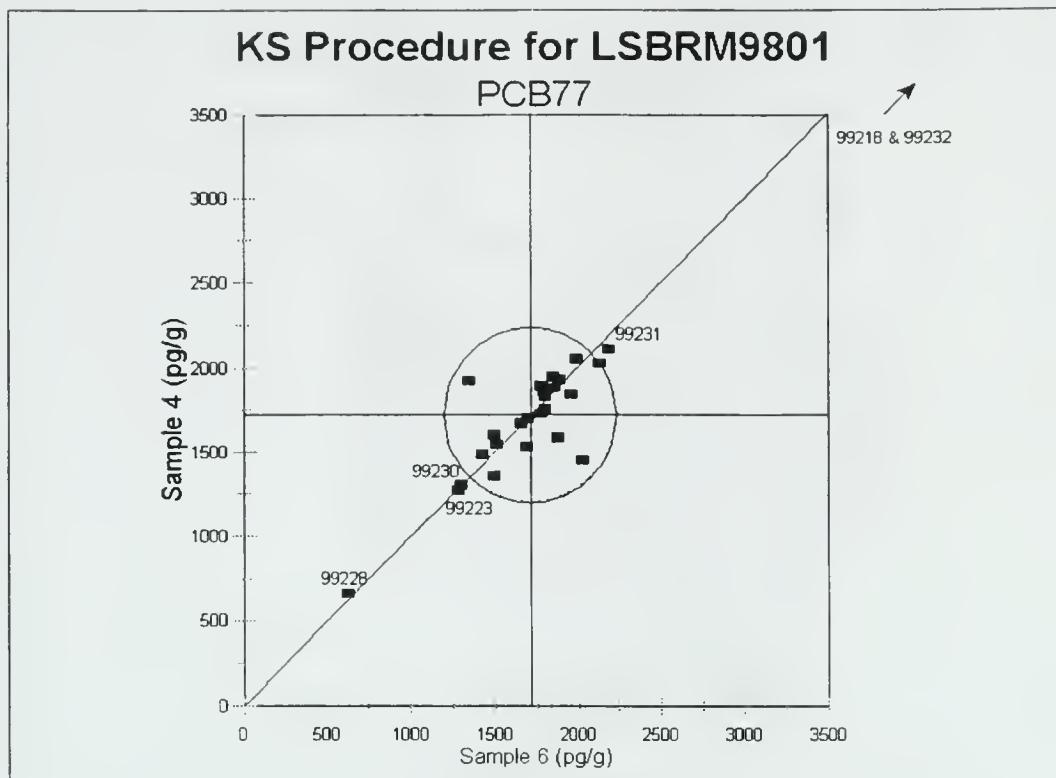


Figure 46: PCB77 in Samples 4 and 6

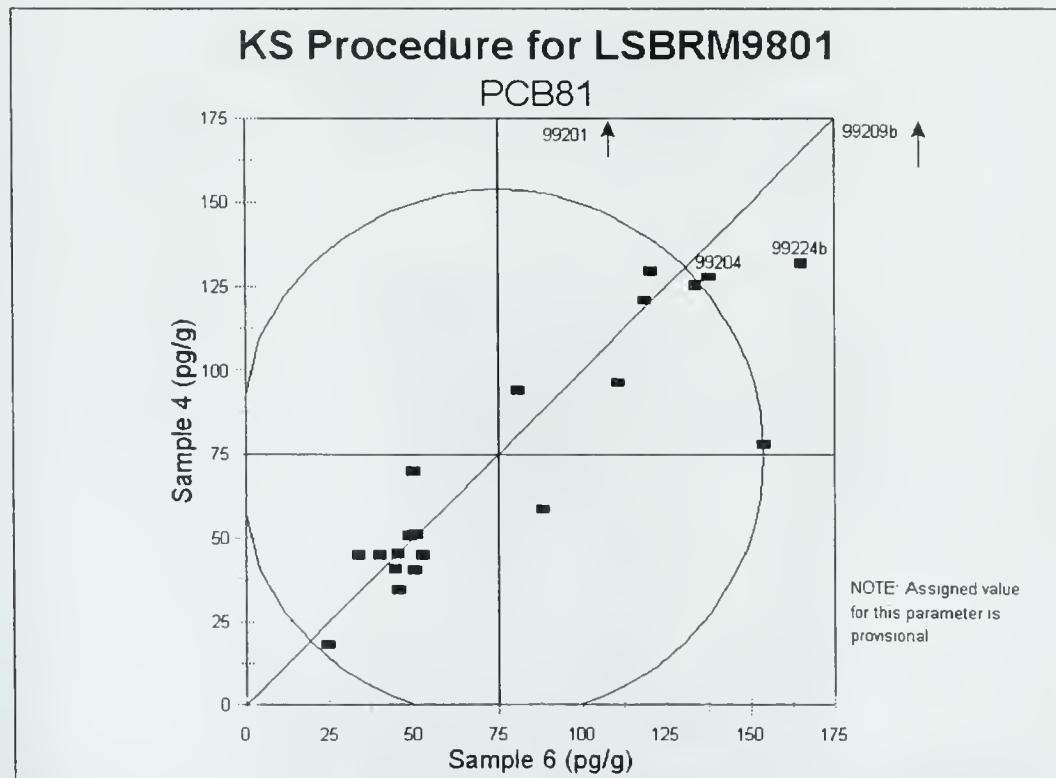


Figure 47: PCB81 in Samples 4 and 6

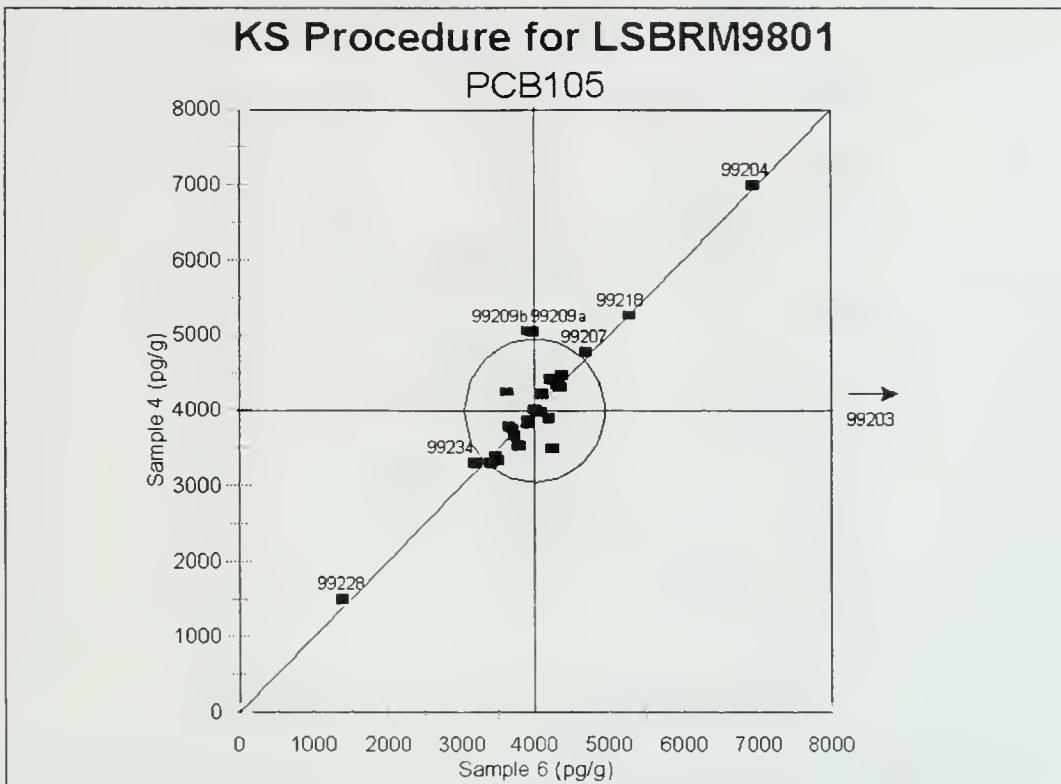


Figure 48: PCB105 in Samples 4 and 6

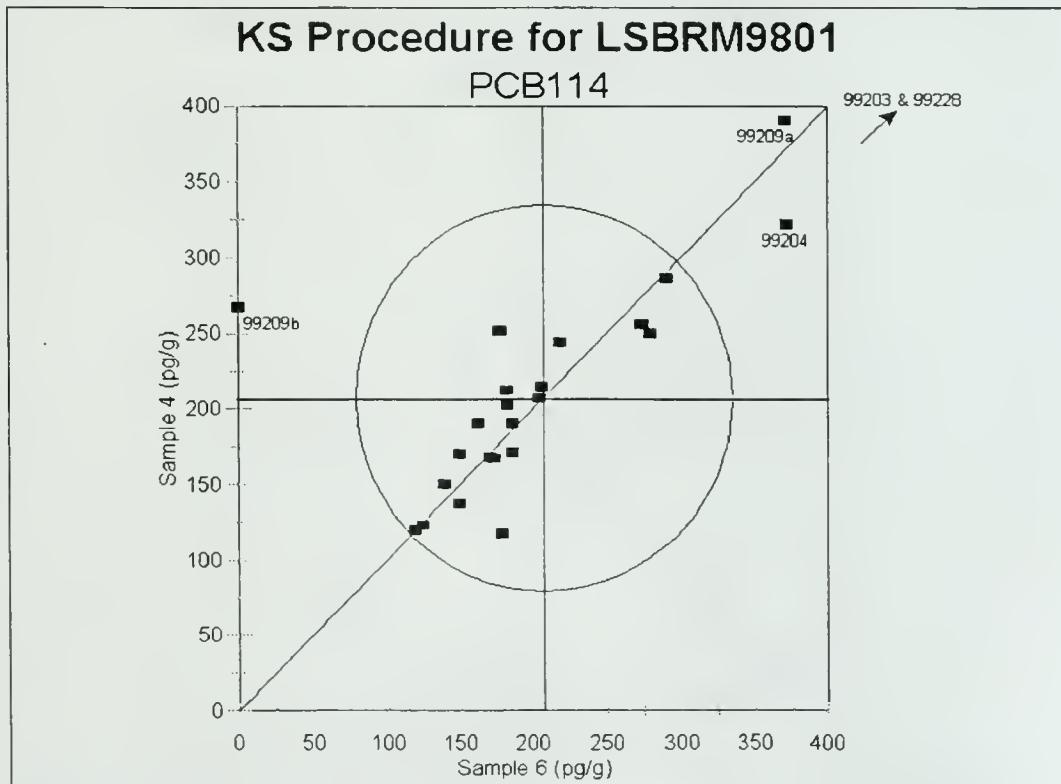


Figure 49: PCB114 in Samples 4 and 6

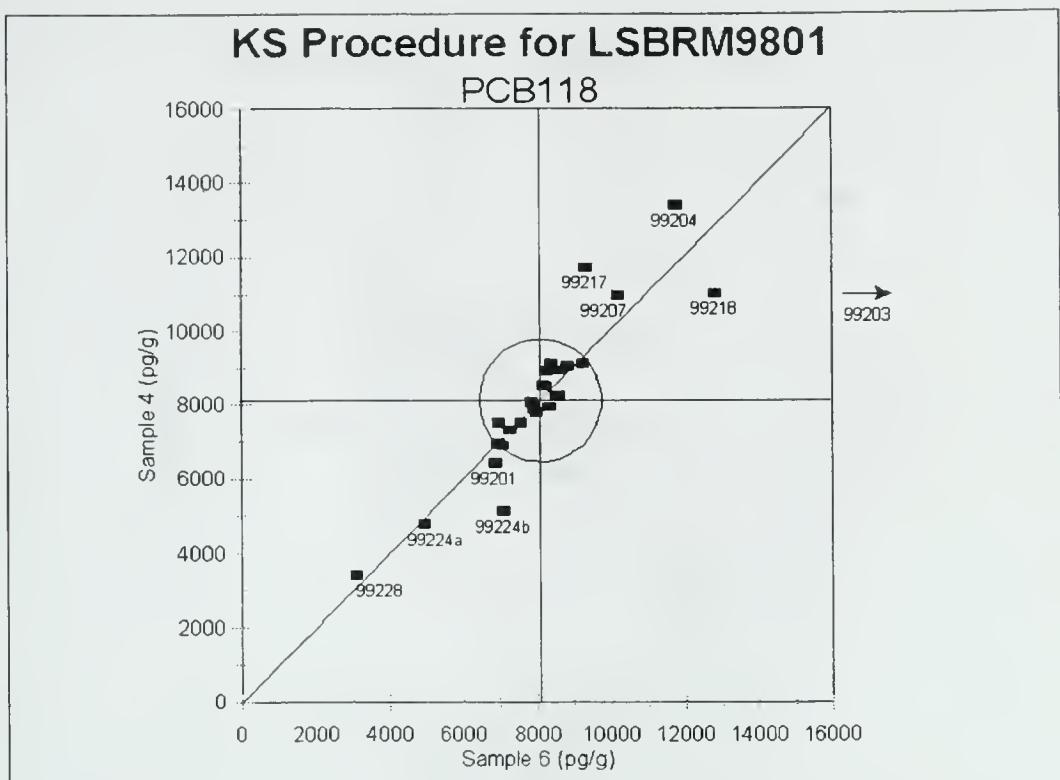


Figure 50: PCB118 in Samples 4 and 6

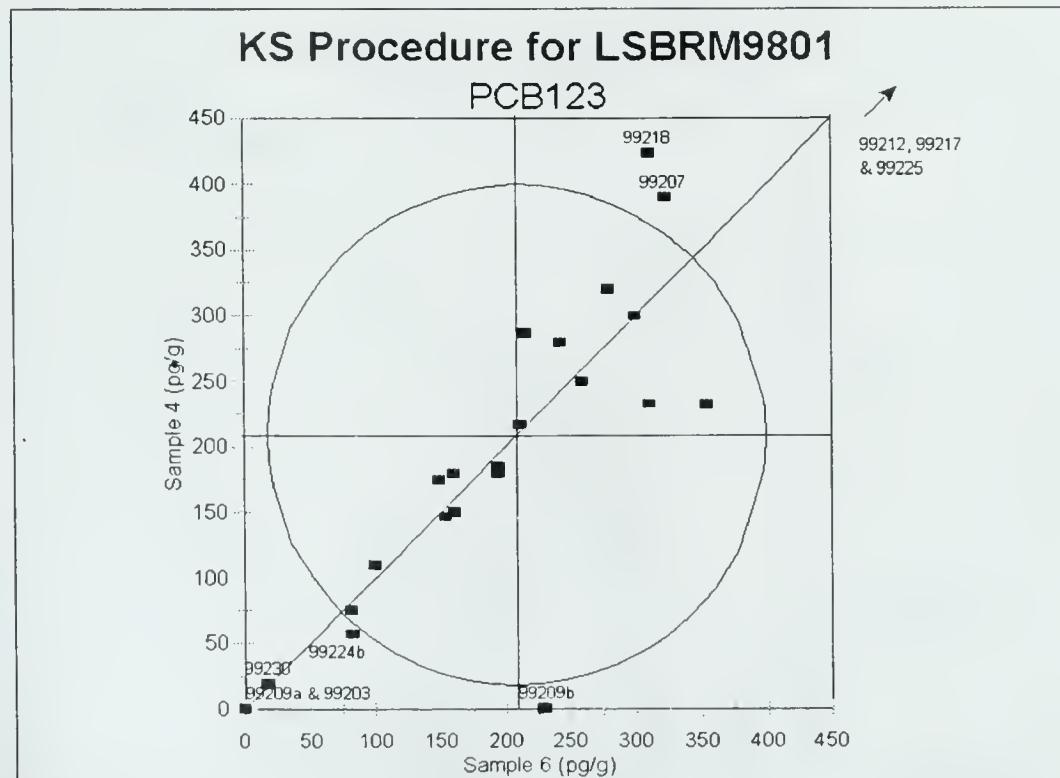


Figure 51: PCB123 in Samples 4 and 6

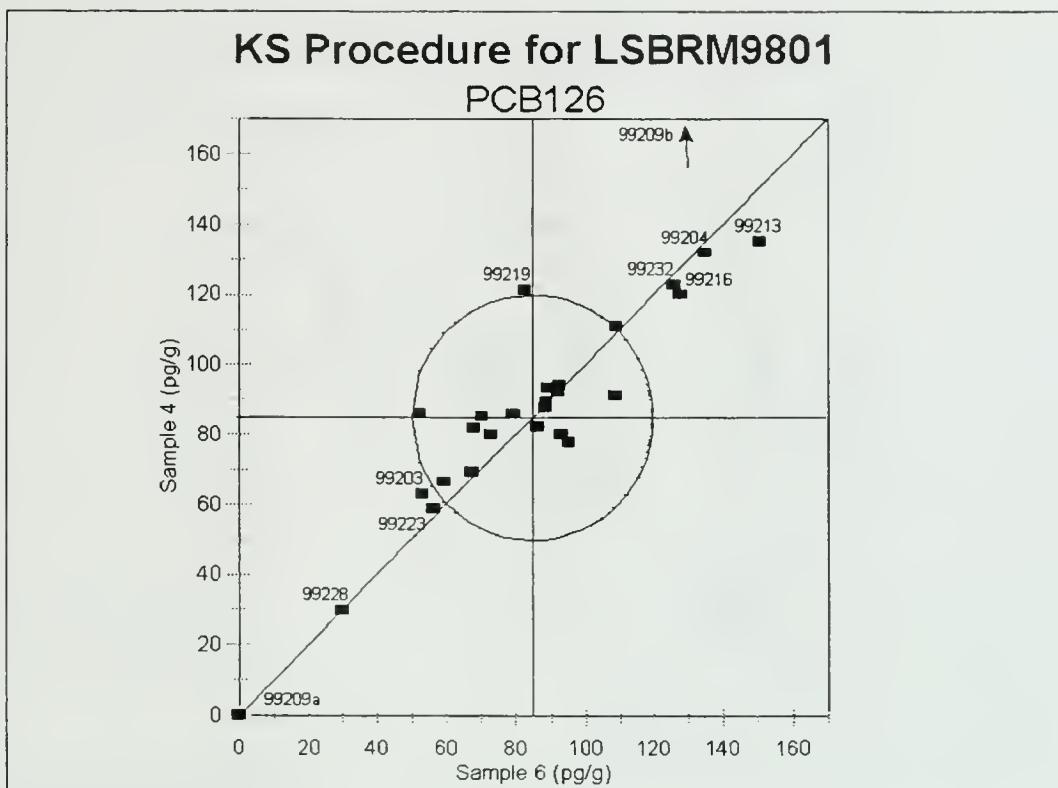


Figure 52: PCB126 in Samples 4 and 6

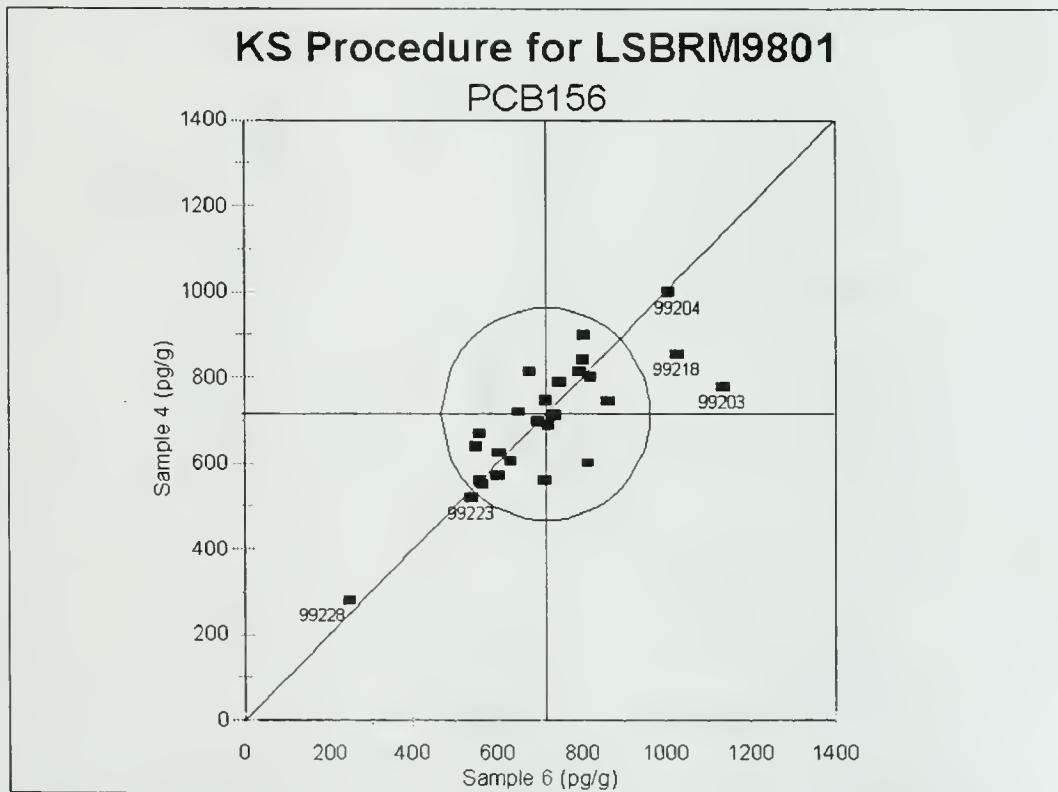


Figure 53: PCB156 in Samples 4 and 6

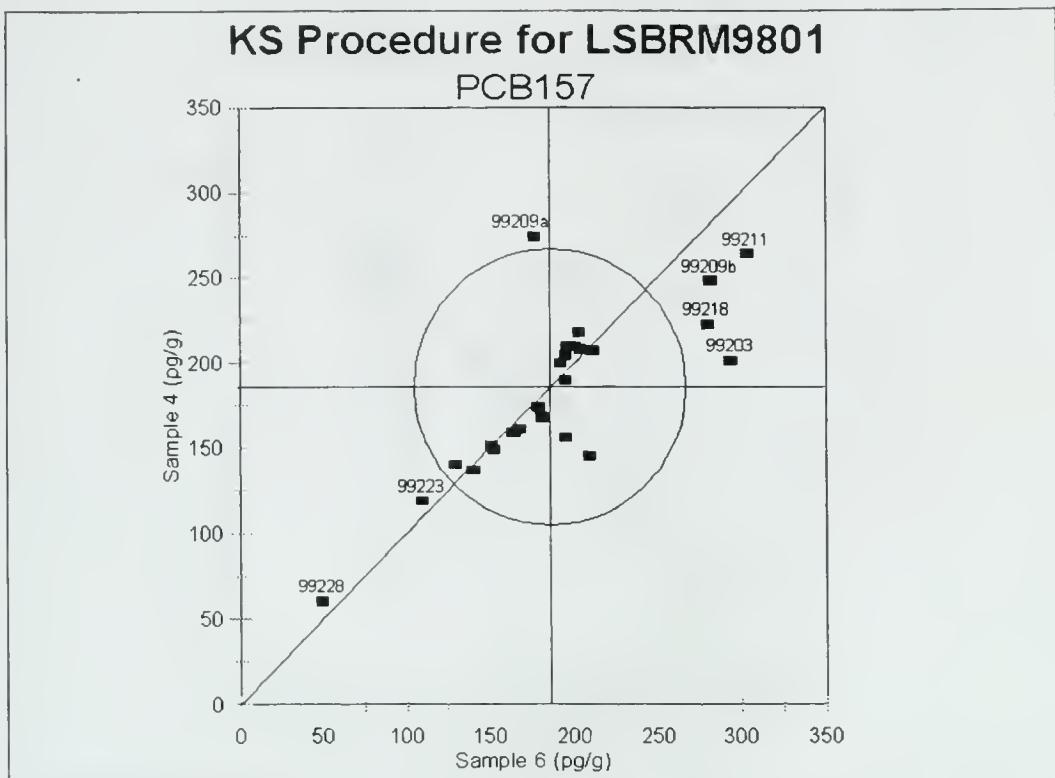


Figure 54: PCB157 in Samples 4 and 6

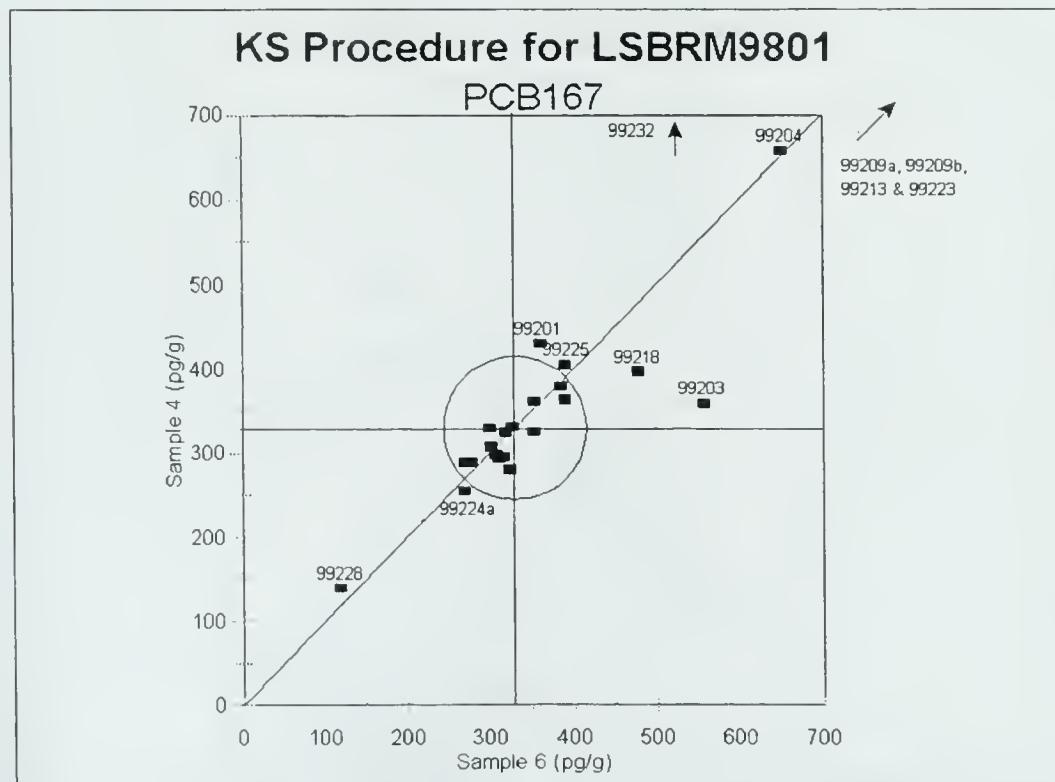


Figure 55: PCB167 in Samples 4 and 6

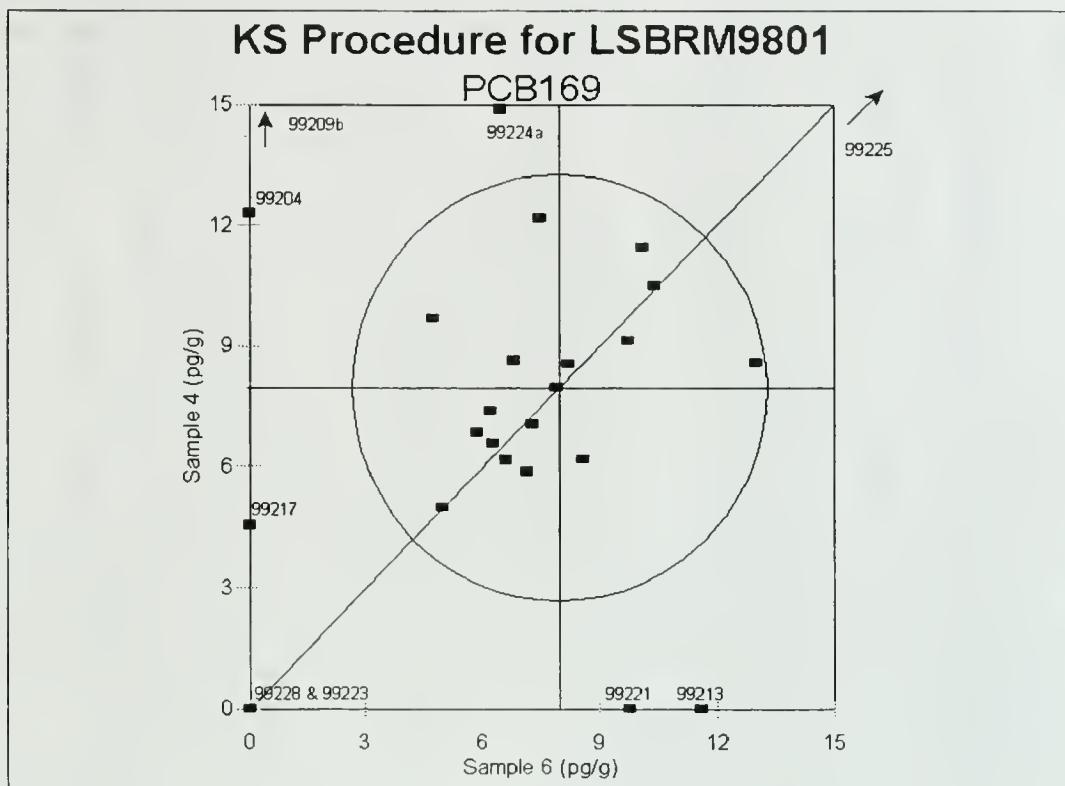


Figure 56: PCB169 in Samples 4 and 6

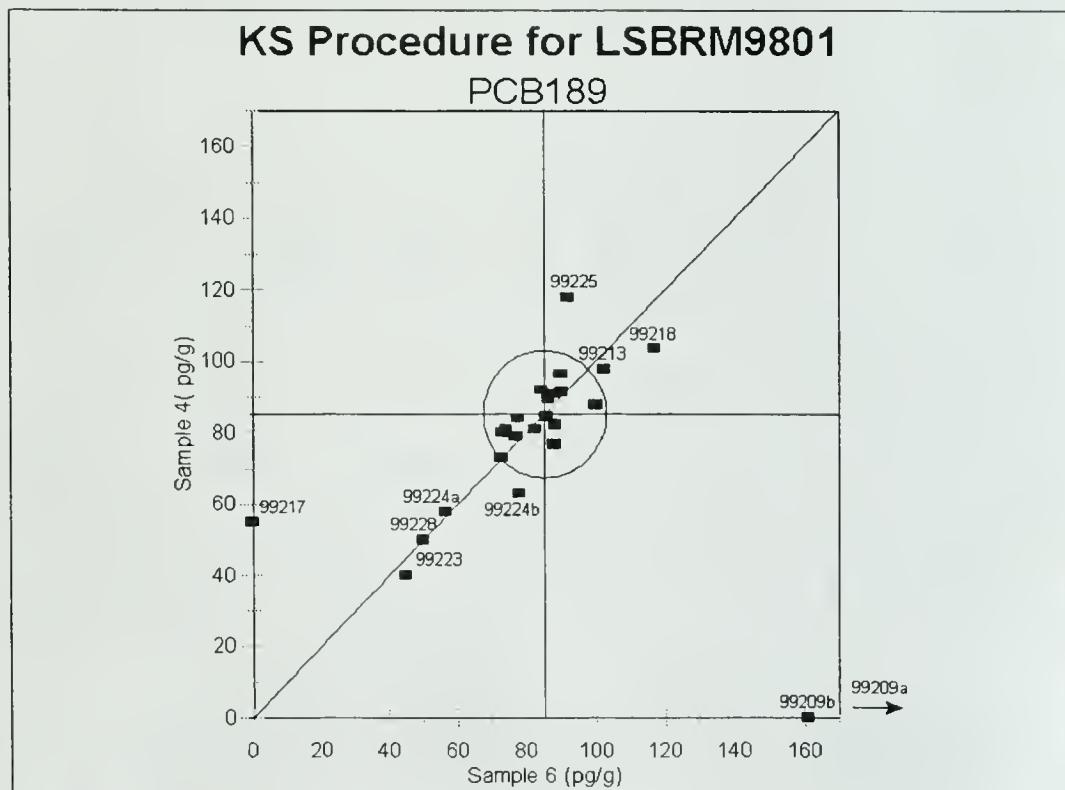


Figure 57: PCB189 in Samples 4 and 6

TABLE 9: EVALUATION OF K-S GRAPHS FOR SAMPLE 4 VS SAMPLE 6

PARAMETER	99201	99203	99204	99205	99206	99207	99208	99209a	99209b	99211	99212	99213	99214	99215	99216	99217	99218
2,3,7,8-TCDD					L-E												
1,2,3,7,8-PeCDD					L												
1,2,3,4,7,8-HxCDD	L		L	L					H								
1,2,3,6,7,8-HxCDD	L		L	L				H									
1,2,3,7,8,9-HxCDD	L		L	L			L-E										
1,2,3,4,6,7,8-HpCDD	H		H-E	H			L										L
1,2,3,4,5,6,7,8-OCDD			H				H										H
2,3,7,8-TCDF		H	H-E	H			H										H
1,2,3,7,8-PeCDF	L														H		
2,3,4,7,8-PeCDF	H		H-E	L	H												L
1,2,3,4,7,8-HxCDF	L		H														H
1,2,3,6,7,8-HxCDF			H-E														H
2,3,4,6,7,8-HxCDF	L		L-E														H
1,2,3,4,6,7,8-HpCDF	H		H														H
1,2,3,4,7,8,9-HpCDF	H		H-E	H													H
1,2,3,4,5,6,7,8-OCDF		L	H		H		L-E	L									H
Analytical Column	S	S	S	S	D	S	S	S	D	S	N/A	D	D	S	D		

Legend:  
L - Biased Low (lower left quadrant)

H - Biased High (upper right quadrant)

H-E - Erratic (upper left quadrant)

L-E - Erratic (lower right quadrant)

Analytical Column:  
S - Single column

D - Dual column

TABLE 9 continued: EVALUATION OF K-S GRAPHS FOR SAMPLE 4 VS SAMPLE 6

PARAMETER	99219	99220	99221	99222	99223	99224a	99224b	99225	99226	99228	99229	99230	99231	99232	99233	99234	99235	99236
2,3,7,8-TCDD	H			L							L						L	
1,2,3,7,8-PeCDD	L										L						H	H
1,2,3,4,7,8-HxCDD				L	L					L	H	H						
1,2,3,6,7,8-HxCDD	H				L	L				L	L					H		
1,2,3,7,8,9-HxCDD					L													
1,2,3,4,6,7,8-HpCDD	H					H	L	H	L		H	L				L		
1,2,3,4,5,6,7,8-OCDD					L						L							
2,3,7,8-TCDF	H	H					H					H			H	H	H	
1,2,3,7,8-PeCDF	L							H			H	L				H	H	
2,3,4,7,8-PeCDF				L		H					L					H	H	
1,2,3,4,7,8-HxCDF		H	L				H											
1,2,3,6,7,8-HxCDF																L	L	
2,3,4,6,7,8-HxCDF	L-E																	
1,2,3,4,6,7,8-HpCDF	H															H	H	
1,2,3,4,7,8,9-HpCDF	L																	
1,2,3,4,5,6,7,8-OCDF	L					H												
Analytical Column	S	S	D	D	D	D	S	D	D	S	D	D	S	D	D	S	S	

Table 9 continued: Evaluation of K-S Graphs for Sample 4 vs Sample 6

Legend: L - Biased Low (lower left quadrant)

H - Biased High (upper right quadrant)

H-E - Erratic (upper left quadrant)

L-E - Erratic (lower right quadrant)

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### Column:

D - Dual column

MURKIN 2

**NOTE:** Prefix of "992" has been omitted from the laboratory ID code in this table.

**10 APPENDIX 5: SUMMARY OF METHODOLOGY QUESTIONNAIRE**

<b>METHODOLOGY SUMMARY: DIOXINS AND DIBENZOFURANS</b>		
Weight of sample extracted	<5 g 5-9 10 g > 10 no information	6 labs 10 labs 13 labs 3 labs 3 labs
Extraction technique	Soxhlet ASE ultrasonic hot extraction	27 labs 4 labs 1 lab 1 lab
Extraction solvent	Toluene Toluene/Acetone Acetone/Hexane Acetone/DCM DCM	27 labs 1 lab 2 labs 1 lab 1 lab
Clean-up Columns	Silica Column AlOx Column Carbon Column Florisil AgNO <sub>3</sub> /silica micro alumina multilayer	31 labs 26 labs 20 labs 5 labs 1 lab 1 lab 2 labs
Other treatments	Acid wash/pretreatment DMSO	5 labs 1 lab
Final solvent of sample	Nonane Dodecane Iso-octane n-Tridecane Tetradecane Toluene n-Decane	13 labs 2 labs 2 labs 2 labs 5 labs 8 labs 1 lab
Final volume of extract	5 - 10 mL 12 - 20 mL 20 - 50 mL 100 mL	6 labs 10 labs 14 labs 2 labs
GC Column: Single	DB-5 DB-5, 60 m DB-5 MS DB-5 MS, 60 m DB-5 MS, 25 m DB-Dioxin DB-Dioxin, 60 m SP-2331, 60 m	2 labs 5 labs 3 labs 4 labs 1 lab 1 lab 1 lab 1 lab

<b>METHODOLOGY SUMMARY: DIOXINS AND DIBENZOFURANS</b>		
GC Columns: Dual	DB-5, 60 m/DB-225, 30 m DB-5, 60 m/DB-Dioxin, 60 m DB-5 MS, 60 m/RTX-2330, 60 m DB-5 MS, 60 m/DB-17, 30 m DB-5 MS, 30 m/CP-Sil88, 60 m DB-Dioxin, 30 m/SGE HTQ-8, 50 m DB-Dioxin, 60 m/RTX-5, 60 m SP-2331, 60 m/17HT, 60 m SP-2331, 60 m/RH-17, 30 m Ultra-2/SPE-231 polar & non-polar	5 labs 1 lab 1 lab 1 lab 1 lab 1 lab 1 lab 1 lab 1 lab 1 lab 1 lab
Carrier Gas	Helium Hydrogen	31 labs 2 labs
Instrumentation	GC/HRMS GC/LRMS GC/MS/MS	30 labs 1 lab 1 lab
Calibration	Single-Point Multi-Point Multi-Point with Continuing Calibration	5 labs 7 labs 17 labs
Labeled Standard(s)	congeners not specified 13C6 1234-TCDD 13C12 1234-TCDD 2F 6789-TCDD 1234-TCDF DS1000 & FS1000 EDF-5999 EDF-4145 ED-2521 13C12 1234-TCDD & 13C12 123789HxCDD 1234-TCDD & 1234789-HpCDD 13C 23478-PeCDF & 13C 1234789-HpCDF 13C 1234-TCDD, 13C 2378-TCDD, & 123789-HxCDD	4 labs 1 lab 2 labs 1 lab 1 lab 1 lab 2 labs 1 lab 1 lab 1 lab 15 labs 1 lab 1 lab 1 lab 1 lab
Injection volume (µL)	1 1.5 2 5	18 labs 2 labs 11 labs 1 lab
Correct for recovery of surrogates	Yes No	27 labs 5 labs
Laboratory accredited	Yes No	21 labs 11 labs
Participate in PE program(s)	Yes No	18 labs 13 labs

<b>METHODOLOGY SUMMARY: DIOXIN-LIKE PCBs (DLPCBs)</b>		
Weight of sample extracted	<5 g 5-9 10 g >10 no information	7 labs 7 labs 8 labs 3 labs 1 lab
Extraction technique	Soxhlet ASE ultrasonic	23 labs 2 labs 1 lab
Extraction solvent	Toluene Toluene/Acetone Acetone/Hexane Acetone/DCM DCM	21 labs 1 lab 1 lab 1 lab 1 lab
Clean-up Columns	Silica Column AlOx Column Carbon Column Florisil AgNO <sub>3</sub> /silica GPC/c18-sio <sub>2</sub> multilayer additional carbon to separate non-ortho PCBs	24 labs 17 labs 14 labs 4 labs 1 lab 1 lab 2 labs 1 lab
Other treatments	Acid wash/pretreatment DMSO HPLC	2 labs 1 lab 1 lab
Final solvent of sample	Nonane Dodecane Iso-octane n-Tridecane Tetradecane Toluene n-Decane Hexane Toluene/Nonane	10 labs 1 lab 1 lab 1 lab 3 labs 8 labs 1 lab 2 labs 1 lab
NOTE: Two laboratories had two fractions in different solvents.		
Final volume of extract	<20 mL 20 - 50 mL 100 mL >100 mL	3 labs 14 labs 7 labs 4 labs
NOTE: Laboratories had different volumes for different fractions.		



<b>METHODOLOGY SUMMARY: DIOXIN-LIKE PCBs (DLPCBs)</b>		
Injection volume ( $\mu\text{L}$ )	0.5 1 1.5 2 3	1 lab 13 labs 1 lab 10 labs 1 lab
Correct for recovery of surrogates	Yes No	17 labs 2 labs
Laboratory accredited	Yes No	5 labs 19 labs
Participate in PE program(s)	Yes No	7 labs 16 labs

## 11 APPENDIX 6: LIST OF PARTICIPANTS REPORTING DATA

Alta Analytical Laboratory, California, U.S.A.  
British Steel, Swinden Technology Centre, United Kingdom  
CARSO, France  
Chemical Evaluation & Research Institute, Japan  
Department of Chemistry, Umeå University, Sweden  
Dioxin Taskforce Team, National Institute of Environmental Analysis, Environmental Protection Administration, Republic of China  
Environmental Laboratory, Institute Quimic de Sarrià, Spain  
Environmental Organic Chemistry, Institute of Environmental Science & Research, Ltd., New Zealand  
Environmental Research Center of the Republic of Bashkortostan, Russia  
Environmental Technology Centre, Environment Canada, Ontario, Canada  
Environnement Québec, Laboratoire de Dioxine, Québec, Canada  
Envirotest Laboratories, Alberta, Canada  
Federal Environmental Agency, Austria  
GSF-National Research Center for Environment & Health, Institute of Ecological Chemistry, Germany  
Institute for Environmental Management, Hungary  
Institute of Inorganic Chemistry, Analytical Division, Cracow University of Technology, Poland  
Instituto Zooprofilattico Sperimentale "G. Caporale", Italy  
Japan Quality Assurance Organization, Japan  
Maxxam Analytical (Mississauga), Ontario, Canada  
Maxxam Analytical (Waterloo), Ontario, Canada  
MicroPollutants Technologie S.A., France  
Midwest Research Institute, Missouri, U.S.A.  
N.A. Severtzov Institute of Ecology and Evolutia, Russian Academy of Sciences, Russia  
National Public Health Institute, Finland  
Ontario Ministry of the Environment, Ontario, Canada  
Philip Analytical Services (Burlington), Ontario, Canada  
Quanterra West Sacramento, California, U.S.A.  
Research and Productivity Council, New Brunswick, Canada  
Scientific Analysis Laboratories, United Kingdom  
Shimadzu Techno Research Inc., Japan  
TÜV Bau und Betrieb GmbH, Environmental Service, Germany  
Triangle Laboratories, Inc., North Carolina, U.S.A.  
Université de Liege, Laboratoire de Spectrometrie de Masse, Belgium  
Wellington Laboratories, Ontario, Canada

**12 APPENDIX 7: CORRESPONDENCE**



# Ontario

# **INVITATION FOR PARTICIPATION IN AN INTERNATIONAL INTERLABORATORY STUDY**

The Ontario Ministry of The Environment, is proposing to produce several non-aqueous, environmental analytical certified reference materials to meet the challenging needs of the environmental analytical community. A series of interlaboratory studies will be conducted to characterize these materials.

You are cordially invited to participate in these studies.

The first of these studies will be conducted in the fall of 1999 and would involve analysis of two solid materials and ampouled standards for dioxin-like polychlorinated diphenyls (DLPCB's) dibenzo-p-dioxin and dibenzofurans (PCDD/F's).

As participants you will receive a comprehensive report containing all analytical data and sufficient materials of one sediment to be used as a reference material for ongoing quality assurance evaluation.

The anticipated date for sample distribution is October 31, 1999 and the results are expected to be reported by January 31, 2000.

If you are interested, please complete the response form on the next page and return by September 30, 1999. If there are any questions you would like to ask before accepting, please do not hesitate to contact either of us by phone, fax or email.

Sylvia Cussion  
phone:416-235-6348  
Fax:416-235-6312  
email:cussiosy@ene.gov.on.ca

Sathi Selliah  
Phone: 416-235-5700  
Fax: 416-235-6312  
email: selliasa@ene.gov.on.ca

Mailing Address: Ministry of the Environment  
Laboratory Services Branch  
125 Resources Road  
Toronto ON, M9P 3V6  
Canada

**MOE INTERLABORATORY STUDY 99-2**

Dioxin-like Polychlorinated Diphenyls, Dibenz-p-dioxin and Dibenzofurans in Solid Matrices  
**(PLEASE PRINT)**

---

INSTITUTE/COMPANY:.....

ADDRESS:.....  
.....  
.....  
.....

COUNTRY:.....

TEL:.....

FAX:.....

Email:.....

CONTACT NAME: .....

We are interested in participating in the above study for the following group of compounds.

Analyte Group	yes/no
DLPCB's	
PCDD/F's	

SIGNATURE:.....

DATE:.....

Please return (or fax) this sheet to: Sylvia Cussion.  
ILS Coordinator  
Ministry of the Environment, Laboratory Services Branch  
125 Resources Road  
Toronto ON, M9P 3V6  
Canada  
Fax: 416-235-6312

Quality Management Unit

Name  
Organization  
Address

November 1, 1999

**RE: MOE INTERLABORATORY STUDY 99-2  
DIOXINS, DIBENZOFURANS & DIOXIN-LIKE PCBs**

Dear Name,

Please find enclosed the following samples for Interlaboratory Study (ILS) 99-2:

Sample 1 - Ampouled Dioxin/Dibenzofuran Standard in Nonane  
Sample 2 - Ampouled Dioxin-Like PCBs Standard in Nonane  
Sample 3 - Ampouled Surrogate in Nonane (Wellington Laboratory, Canada)

Sample 4 - Dried Sediment #1  
Sample 5 - Dried Sediment #2  
Sample 6 - Dried Sediment #3  
Sample 7 - Dried Sediment #4  
Sample 8 - Dried Sediment #5

Please contact either Sathi Selliah or myself if you did not receive all of the samples intact and we will send replacement samples.

The samples are to be analyzed using your routine methods for dioxins, dibenzofurans, and dioxin-like PCBs. Please read the enclosed instruction before proceeding with the analysis.

Enclosed is a report form for the results and a questionnaire regarding your methodology to be returned with your results. The report form is also provided in three different electronic formats on the enclosed diskette. These formats are Lotus 1-2-3,V.2.x, Excel97, and QuattroPro8. The questionnaire is in WordPerfect 8 and MS Word97. Please choose the format that is most suitable for you and return your results electronically, if possible.

Please return all results by January 31, 2000.

Your confidential study ID Code is: id\_code

Thank you for participating in this interlaboratory study.

Sylvia Cussion  
ILS Coordinator  
+1 416 235 6348  
FAX: +1 416 235 6312  
e-mail: [cussiosy@cne.gov.on.ca](mailto:cussiosy@cne.gov.on.ca)

Sathi Selliah  
PE Coordinator  
+1 416 235 5700  
FAX: +1 416 235 6312  
e-mail: [selliasa@ene.gov.on.ca](mailto:selliasa@ene.gov.on.ca)

## MOE INTERLABORATORY STUDY 99-2 DIOXINS, DIBENZOFURANS & DIOXIN-LIKE PCBs

### SAMPLE INSTRUCTION SHEET

#### SAMPLES 1 & 2: AMPOULED STANDARDS

These two solutions are in n-Nonane and are ready for direct instrumental injection. The concentration range is between 30 - 100 ng/mL. If you require to dilute the solution, please record the dilution factor on the results form.

Sample 1 contains dioxins and dibenzofurans. Sample 2 contains dioxin-like PCBs. All compounds present are listed on the results form.

You are requested to report the results from a single injection of these solutions. If you repeat the analysis and wish to report duplicate results, you may do so. **Please report your results with a minimum of 3 figures.**

#### SAMPLE 3: AMPOULED SURROGATE

This solution has been provided by Wellington Laboratories, Guelph, Ontario, Canada, to use as part of the analysis of the sediments for dioxin-like PCBs. This is an optional solution. An instruction sheet is included from Wellington, listing the concentrations of the compounds in the solution.

Please report the results of your surrogates as percent recovery, whether you use the solution provided or your own standards. Please indicate on the methodology questionnaire whether you used the surrogates provided or surrogates from alternate sources.

#### SAMPLES 4 - 8: DRIED SEDIMENTS

Please analyze these samples using your routine methods. **Please analyze them as received. DO NOT DRY THEM.**

You are requested to report the results from a single extraction of these samples. If you repeat the analysis and wish to report duplicate results, you may do so. **Please report your results with a minimum of 3 figures.**

### REPORTING RESULTS

A hard copy of the results report form and the methodology questionnaire have been provided, as well as electronic copies on the enclosed diskette. Please report the results electronically either by e-mail ([cussiosy@ene.gov.on.ca](mailto:cussiosy@ene.gov.on.ca) or [selliasa@ene.gov.on.ca](mailto:selliasa@ene.gov.on.ca)) or by mailing the diskette in the self-addressed mailer. The results report form has been provided in three different formats (QuattroPro 8, Excel97 and Lotus 1-2-3, V.2.x) and the methodology questionnaire in two different formats (Wordperfect 8 and MSWord97). Please use whichever format is most convenient.

**To confirm the accuracy of the electronic transmissions of results, please forward a hard copy of the results, either by FAX (+1 416 235 6312) or mail.**

**DUE DATE: JANUARY 31, 2000**  
**LABORATORY ID CODE:**

PARAMETER	CAS NO.	UNITS	INJECTION STANDARDS	
			SAMPLE 1	SAMPLE 2
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1746-01-6	ng/mL		n/a
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	40321-76-4	ng/mL		n/a
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	39227-28-6	ng/mL		n/a
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	57653-85-7	ng/mL		n/a
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	19408-74-3	ng/mL		n/a
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	35822-46-9	ng/mL		n/a
1,2,3,4,5,6,7,8-Octachlorodibenzo-p-dioxin (OCDD)	3268-87-9	ng/mL		n/a
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	51207-31-9	ng/mL		n/a
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	57117-41-6	ng/mL		n/a
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	57117-31-4	ng/mL		n/a
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	70648-26-9	ng/mL		n/a
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	57117-44-9	ng/mL		n/a
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	72918-21-9	ng/mL		n/a
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	60851-34-5	ng/mL		n/a
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	67562-39-4	ng/mL		n/a
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	55673-89-7	ng/mL		n/a
1,2,3,4,5,6,7,8-Octachlorodibenzofuran (OCDF)	39001-02-0	ng/mL		n/a
Total Tetrachlorodibenzo-p-dioxins (TCDD)	41903-57-5	ng/mL		n/a
Total Pentachlorodibenzo-p-dioxins (PeCDD)	36088-22-9	ng/mL		n/a
Total Hexachlorodibenzo-p-dioxins (HxCDD)	34465-46-8	ng/mL		n/a
Total Heptachlorodibenzo-p-dioxins (HpCDD)	37871-00-4	ng/mL		n/a
Total Tetrachlorodibenzofurans (TCDF)	55722-27-5	ng/mL		n/a
Total Pentachlorodibenzofurans (PeCDF)	30402-15-4	ng/mL		n/a
Total Hexachlorodibenzofurans (HxCDF)	55684-94-1	ng/mL		n/a
Total Heptachlorodibenzofurans (HpCDF)	38998-75-3	ng/mL		n/a
PCB 77	32598-13-3	ng/mL	n/a	
PCB 81	70362-50-4	ng/mL	n/a	
PCB 105	32598-14-4	ng/mL	n/a	
PCB 114	74472-37-0	ng/mL	n/a	
PCB 118	31508-00-6	ng/mL	n/a	
PCB 123	65510-44-3	ng/mL	n/a	
PCB 126	57465-28-8	ng/mL	n/a	
PCB 156	38380-08-4	ng/mL	n/a	
PCB 157	69782-90-7	ng/mL	n/a	
PCB 167	52663-72-6	ng/mL	n/a	
PCB 169	32774-16-6	ng/mL	n/a	
PCB 189	39635-31-9	ng/mL	n/a	

**DUE DATE: JANUARY 31, 2000**  
**LABORATORY ID CODE:**

PARAMETER	CAS NO.	UNITS	SEDIMENT SAMPLES				
			SAMPLE 4	SAMPLE 5	SAMPLE 6	SAMPLE 7	SAMPLE 8
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1746-01-6	pg/g					
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	40321-76-4	pg/g					
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	39227-28-6	pg/g					
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	57653-85-7	pg/g					
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	19408-74-3	pg/g					
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	35822-46-9	pg/g					
1,2,3,4,5,6,7,8-Octachlorodibenzo-p-dioxin (OCDD)	3268-87-9	pg/g					
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	51207-31-9	pg/g					
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	57117-41-6	pg/g					
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	57117-31-4	pg/g					
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	70648-26-9	pg/g					
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	57117-44-9	pg/g					
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	72918-21-9	pg/g					
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	60851-34-5	pg/g					
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	67562-39-4	pg/g					
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	55673-89-7	pg/g					
1,2,3,4,5,6,7,8-Octachlorodibenzofuran (OCDF)	39001-02-0	pg/g					
Total Tetrachlorodibenzo-p-dioxins (TCDD)	41903-57-5	pg/g					
Total Pentachlorodibenzo-p-dioxins (PeCDD)	36088-22-9	pg/g					
Total Hexachlorodibenzo-p-dioxins (HxCDD)	34465-46-8	pg/g					
Total Heptachlorodibenzo-p-dioxins (HpCDD)	37781-00-4	pg/g					
Total Tetrachlorodibenzofurans (TCDF)	55722-27-5	pg/g					
Total Pentachlorodibenzofurans (PeCDF)	30402-15-4	pg/g					
Total Hexachlorodibenzofurans (HxCDF)	55684-94-1	pg/g					
Total Heptachlorodibenzofurans (HpCDF)	38998-75-3	pg/g					
Surrogate Recovery		%					
		%					
		%					

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PARAMETER	CAS NO.	UNITS	SEDIMENT SAMPLES	SAMPLE 4	SAMPLE 5	SAMPLE 6	SAMPLE 7	SAMPLE 8
PCB 77	322598-13-3	pg/g						
PCB 81	70362-50-4	pg/g						
PCB 105	322598-14-4	pg/g						
PCB 114	74472-37-0	pg/g						
PCB 118	31508-00-6	pg/g						
PCB 123	65510-44-3	pg/g						
PCB 126	57465-28-8	pg/g						
PCB 156	38380-08-4	pg/g						
PCB 157	69782-90-7	pg/g						
PCB 167	52663-72-6	pg/g						
PCB 169	32774-16-6	pg/g						
PCB 189	396335-31-9	pg/g						
<b>Surrogate Recovery</b>								
PCB 77 C13	105600-23-2	%						
PCB 81 C13	208461-24-9	%						
PCB 105 C13	208263-62-1	%						
PCB 114 C13	208263-63-2	%						
PCB 118 C13	104130-40-7	%						
PCB 123 C13	208263-64-3	%						
PCB 126 C13	208263-65-4	%						
PCB 156 C13	208263-68-7	%						
PCB 157 C13	235416-30-5	%						
PCB 167 C13	208263-69-8	%						
PCB 169 C13	208263-70-1	%						
PCB 189 C13	208263-73-4	%						

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DIOXINS, DIBENZOFURANS & DIOXIN-LIKE PCBs IN SEDIMENT  
DUE DATE: JANUARY 31, 2000

**LABORATORY ID CODE:** \_\_\_\_\_

**1. SAMPLE RECEIPT**

Date Samples Received: \_\_\_\_\_

Date Analysis Initiated: \_\_\_\_\_

Storage Condition of Samples Prior to Analysis: \_\_\_\_\_  
\_\_\_\_\_

**PART A - DIOXINS & DIBENZOFURANS**

**2. SAMPLE PREPARATION - DIOXINS & DIBENZOFURANS**

Sample Weight: \_\_\_\_\_

Extraction Technique: \_\_\_\_\_

Extraction Solvent: \_\_\_\_\_

Source of Labeled Standards: \_\_\_\_\_

When are Labeled Standards introduced to the sample: \_\_\_\_\_

**3. SAMPLE CLEAN-UP - DIOXINS & DIBENZOFURANS**

Are "Clean-up" Standards added to the sample: Yes [ ] No [ ]

If "yes", please identify type, source, and when they are added to the sample: \_\_\_\_\_

Silica Column:

AlOx Column:

Carbon Column:

Other Column(s):

Other Procedure (eg. adsorbant in a beaker):

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**DIOXINS, DIBENZOFURANS & DIOXIN-LIKE PCBs IN SEDIMENT  
DUE DATE: JANUARY 31, 2000**

**LABORATORY ID CODE:**

**Final Solvent of Sample:** \_\_\_\_\_

**Final Volume of Sample:** \_\_\_\_\_

## 4. INSTRUMENTAL ANALYSIS - DIOXINS & DIBENZOFURANS

**GC Column:** Varian 33L, 30 m x 0.25 mm I.D., 0.25  $\mu$ m film thickness.

**GC Program:**

**Head Pressure:** \_\_\_\_\_ **Carrier Gas:** \_\_\_\_\_

**Please circle the following which applies:**      **GC/LRMS**      **GC/HRMS**      **GC/MS/MS**

**Manufacturer and Model:**

## **Resolution:**

**Source of Calibration Standards:**

Type of Calibration: single-point [ ] two-point [ ] multi-point [ ]  
multi-point with continuing calibration [ ]

**Addition of further labeled standard to extract immediately prior to instrumental analysis:**

Yes [ ] No [ ]

If "Yes", source and type of standards used:

**Volume of sample injected:**

**Do you routinely correct sample results for recovery of surrogates?** Yes  No

## **5. LABORATORY INFORMATION - DIOXINS & DIBENZO-FURANS**

**Is your laboratory accredited for this analysis** Yes  No

If "yes", who is the accreditation body and standard used?

**Does your laboratory participate in a proficiency testing program for this analysis?**

Yes [ ] No [ ]

If "yes", please identify the program.

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**DIOXINS, DIBENZOFURANS & DIOXIN-LIKE PCBs IN SEDIMENT  
DUE DATE: JANUARY 31, 2000**

**LABORATORY ID CODE:** \_\_\_\_\_

How many years has your laboratory performed analysis for dioxins & dibenzofurans? \_\_\_\_\_

Approximately how many samples of this type do you analyze annually? \_\_\_\_\_

**PART B - DIOXIN-LIKE PCBs**

**2. SAMPLE PREPARATION - DIOXIN-LIKE PCBs**

Sample Weight: \_\_\_\_\_

Extraction Technique: \_\_\_\_\_

Extraction Solvent: \_\_\_\_\_

Source of Labeled Standards: \_\_\_\_\_

When are Labeled Standards introduced to the sample: \_\_\_\_\_

**3. SAMPLE CLEAN-UP - DIOXIN-LIKE PCBs**

Are "Clean-up" Standards added to the sample: Yes  No

If "yes", please identify type, source, and when they are added to the sample: \_\_\_\_\_

Silica Column: \_\_\_\_\_

AlOx Column: \_\_\_\_\_

Carbon Column: \_\_\_\_\_

Other Column(s): \_\_\_\_\_

Other Procedure (eg. adsorbant in a beaker): \_\_\_\_\_

Final Solvent of Sample: \_\_\_\_\_

Final Volume of Sample: \_\_\_\_\_

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**DIOXINS, DIBENZOFURANS & DIOXIN-LIKE PCBs IN SEDIMENT  
DUE DATE: JANUARY 31, 2000**

**LABORATORY ID CODE:**

#### 4. INSTRUMENTAL ANALYSIS - DIOXIN-LIKE PCBs

**GC Column:** \_\_\_\_\_

**GC Program:** \_\_\_\_\_

**Head Pressure:** \_\_\_\_\_ **Carrier Gas:** \_\_\_\_\_

Please circle the following which applies:      GC/LRMS      GC/HRMS      GC/MS/MS

**Manufacturer and Model:** \_\_\_\_\_

**Resolution:** The resolution is to increase the number of staff members in the accounting department by 10%.

### **Source of Calibration Standards:**

Type of Calibration: single-point [ ] two-point [ ] multi-point [ ]

multi-point with continuing calibration [ ]

#### **Addition of further labeled standard to extract immediately prior to instrumental analysis:**

Yes [ ] No [ ]

If "Yes", source and type of standards used:

**Volume of sample injected:**

**Do you routinely correct sample results for recovery of surrogates?** Yes  No

## 5. LABORATORY INFORMATION - DIOXIN-LIKE PCBs

**Is your laboratory accredited for this analysis** Yes  No

If "yes", who is the accreditation body and standard used?

**Does your laboratory participate in a proficiency testing program for this analysis?**

Yes [ ] No [ ]

If "yes", please identify the program.

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**DIOXINS, DIBENZOFURANS & DIOXIN-LIKE PCBs IN SEDIMENT  
DUE DATE: JANUARY 31, 2000**

**LABORATORY ID CODE:**

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**How many years has your laboratory performed analysis for dioxin-like PCBs?**

**mono/orthos:** \_\_\_\_\_

**coplanars:** \_\_\_\_\_

**Approximately how many samples of this type do you analyze annually?** \_\_\_\_\_

**ADDITIONAL COMMENTS RE MOE STUDY 99-2**





